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**DEWATERING PIT
SAMPLING AND ANALYSIS PLAN
TO SUPPORT REMEDIAL DESIGN**

**SIMPLOT PLANT AREA
EASTERN MICHAUD FLATS SUPERFUND SITE**

POCATELLO, IDAHO

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MFG, Inc.

consulting scientists and engineers

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EASTERN MICHAUD FLATS SUPERFUND SITE**

POCATELLO, IDAHO

October 10, 2002

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1.0 INTRODUCTION

This document presents a sampling and analysis plan (SAP) for collection of Toxicity Characteristic Leaching Procedure (TCLP) data for residual solids in the Dewatering Pit in the Simplot Plant Area of the Eastern Michaud Flats (EMF) Superfund Site, located near Pocatello, Idaho. The data are being collected to support remedial design.

Remediation of the Dewatering Pit is part of the comprehensive remedy for the EMF Site as described in the Record of Decision (ROD; USEPA, 1998) and subsequent Consent Decree for the Simplot Plant Area (USEPA, 2002). A Pre-Final Remedial Design Report (RDR)/Draft Remedial Action Work Plan (RAWP) for the Dewatering Pit (Simplot, 2002) was submitted to EPA on August 5, 2002.

The scope of work, objectives and performance standard for this portion of the remedial action are specified in the Consent Decree Statement of Work, as follows:

"The Dewatering Pit Element of Work includes excavation of phosphate ore residuals from the Dewatering Pit, disposal of excavated materials on the gypsum stack, covering the excavated area with soil and vegetation.

- a. The objective is to prevent incidental worker exposure to the solids in the Dewatering Pit by removing residual solids from the pit area.*
- b. The performance standard for this Element of Work will be removal of residual Dewatering Pit solids as verified through confirmatory soil sampling."*

Although EPA's selected remedy specifies that excavated materials be relocated to the gypsum stack, Simplot wants to verify that the materials when excavated would not exhibit the Toxicity Characteristic, as determined by the TCLP test, prior to implementation of the action.

1.1 Site Description And Project History

The EMF Site is located near the City of Pocatello, Idaho and includes two industrial facilities: the FMC Elemental Phosphorus Facility (ceased operations in December 2001) and the J.R. Simplot Don Plant. FMC produced elemental phosphorus. The Don Plant produces phosphoric acid and a variety of liquid and solid fertilizers. The EPA has divided the Site into three areas: the FMC Plant Area includes the FMC facility and adjacent land owned by FMC; the Simplot Plant Area includes the Don Plant and

adjacent land owned by Simplot; and the Off-Plant Area, which surrounds the FMC- and Simplot-Plant Areas.

The Simplot Don Plant covers approximately 745 acres and adjoins the eastern property boundary of the FMC facility. The main portion of the plant lies approximately 500 feet southwest of the Portneuf River. Of the 745 acres, approximately 400 acres are committed to the gypsum stack. Another 185 acres are occupied by the plant and its infrastructure. A significant portion of the remaining acreage to the south and southeast of the plant consists of cliffs and rugged steep terrain. A Union Pacific Railroad right-of-way is adjacent to the northern fence line of the Don Plant and passes through the northern portion of the Simplot Subarea, paralleling U.S. Highway 30. Access to the Don Plant is provided by I-86 and U.S. Highway 30.

The Don Plant began production of a single superphosphate fertilizer in 1944. Phosphoric acid production began in 1954. Currently, the plant produces 12 principal products, including five grades of solid fertilizers and four grades of liquid fertilizers. The principal raw materials for the process are phosphate ore, which is transported to the facility via a slurry pipeline from the Smoky Canyon mine, sulfur, and ammonia. The primary byproduct from the Don Plant process is gypsum (calcium sulfate) which is stacked on site.

An Administrative Order on Consent (AOC) was issued by the U.S. Environmental Protection Agency (EPA) on May 30, 1991 and entered into voluntarily by FMC and Simplot. The AOC specified requirements for implementation of a Remedial Investigation (RI) and Feasibility Study (FS) to evaluate site conditions and remedial alternatives to address any potential threats to human health and the environment. Based on the findings of these studies, EPA issued a ROD (USEPA, 1998), specifying the selected remedial actions for the Site on June 8, 1998. A Consent Decree (USEPA, 2002) between EPA and Simplot, which specified the conditions for implementing the selected remedial actions in the Simplot Plant Area was entered on May 9, 2002.

1.2 Dewatering Pit Characteristics

The Dewatering Pit is located north of the Don Plant, between Highway 30 and Interstate 86, as shown on Figure 1. The Dewatering Pit was constructed and used briefly by Simplot to contain excess phosphate ore and pond solids from the period of start up for the ore slurry pipeline around 1991.

1.2.1 Physical Characteristics

The Dewatering Pit consists of three bermed areas. The surface area of the bottom of the eastern pit measures approximately 23,150 square feet. The surface area of the western pit is approximately 15,100 square feet, and the surface area of the small southern pit is 3,500 square feet. The berms are approximately eight feet high except on the side of Interstate 86, where the berms vary in height from eight to twelve feet. The berms are reportedly constructed of native soil and gravel that was excavated from the interior of the pits during construction. The solids within these pits consists primarily of phosphate ore residuals and solids precipitated by pH adjustment of irrigation waters, which can be visually recognized by their gray color in contrast to the light brown-colored native soil.

Inspections of the Dewatering Pit conducted on August 8, 2002 found that the residual solid material appears to be homogeneous and no layering was observed. In the West Dewatering Pit (Figure 1) the depth of residual solids was observed at five inches deep in the middle and less deep toward the edges. In the East Dewatering Pit, were approximately 12 to 14 inches deep in the middle of the pit. The material is loose, such that it is not possible to get a clean side cut to stand vertically. The South Dewatering Pit is a much smaller area and inspection found that residual solids are typically half an inch deep or less.

1.2.2 Chemical Characteristics

The RI found that the residual solids could be distinguished from soils based on the concentrations of various inorganic constituents, principally fluoride, phosphorus, cadmium, chromium, vanadium and zinc (Bechtel, 1996). During the RI, a single soil boring (S008B) was drilled within the eastern pit. The material encountered in the first 2.5 feet of this boring consisted of residual solids. The material encountered in the remainder of the boring consisted of sand (2.5 to 4 feet bgs), and gravel (4 to 27 feet bgs). Soil samples were collected at the surface and from depths of 2.5, 10, 20 and 26 feet bgs. These are the only samples that have been collected of the Dewatering Pit solids.

The concentrations of indicator constituents measured in the soil samples are summarized in Table 1.

Table 1
Concentrations of Indicator Constituents in Dewatering Pit Solids and Underlying Soils

Constituent	Background Levels (mg/kg) ¹	Sampling Depth (feet)				
		Surface	2.5	10	20	26
		Concentration (mg/kg)				
Arsenic	7.7	15	<3.3	<2.8	<2.3	<0.55
Beryllium	1.0	5.2	0.23	0.19	0.13	0.12
Cadmium	1.9	131	0.54	0.49	0.5	0.49
Chromium	27.5	2,710	16.3	30.9	31.1	8.9
Fluoride	600	30,000	710	550	320	140
Phosphorus	672	51,300	544	501	301	407
Zinc	52.8	3,610	35.8	37.2	24.8	25.3

Note:

1. Background constituent levels for site soils derived by EPA.

An examination of the results of the chemical analysis indicates that the sample of residual solids collected at the surface contained concentrations of a number of constituents above background soil levels. In the sample collected at a depth of 2.5 feet (just below the residual solids/soil interface), all constituents were at or below background concentrations, with the exception of fluoride (710 mg/kg). However, at 10 feet chromium, molybdenum, and nickel were above background levels (see Table 4.2.2-22 of the RI report for additional data). The background levels were selected by EPA during the RI to provide a value representative of regional levels. There are several soil types within the site, which have different naturally-occurring levels of constituent. There is no known transport pathway for chromium, molybdenum, and nickel to subsurface soils in the vicinity of the Dewatering Pit and therefore the measured concentrations appear to represent naturally-occurring levels.

2.0 DATA QUALITY OBJECTIVES

A streamlined version of EPA's data quality objectives process (EPA, 2000) was used to develop a sampling and analysis approach and optimize the study design. This process allows for adequate data to be collected for decision-making purposes.

2.1 Statement of the Issue

As described above, the remedial action for the Dewatering Pit is specified as excavating residual solids and relocating them to the gypsum stack. Simplot wants to verify that the solids, when excavated, would not exhibit the toxicity characteristic, as determined by the TCLP test. If the materials are found to exhibit the toxicity characteristic, then the scope of the remedy will be revisited with EPA, and modifications will be made to the remedial design, as necessary.

2.2 Identify the Decision

The principal study question is would the residual solids, when excavated, exhibit the toxicity characteristic, as determined by the TCLP test or the corrosivity characteristic, as determined by EPA Method 9040B. If the solids do exhibit the toxicity or corrosivity characteristic, relocation to the gypsum stack may not be appropriate and the scope of the remedy for the Dewatering Pit will require reevaluation.

2.3 Identify Inputs to the Decision

Chemical data describing the average toxicity leaching characteristics will be required to make the decision described above (because the materials would be well mixed after excavation). In particular, concentrations of arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver measured by TCLP testing and corrosivity evaluated by EPA Method 9040B will be required.

The EMF Site has undergone an exhaustive Remedial Investigation (RI) that found, in part, that site materials do not contain organic contaminants at levels of interest from either a risk or regulatory perspective (Bechtel, 1996). The residual materials in the Dewatering Pit are derived from excess phosphate ore and from pond solids from the period of start up for the ore slurry pipeline around 1991.

Neither of these would be expected to contain organic contaminants at levels that could be of concern due to Toxicity Characteristics (as defined in 40 CFR 261.24).

2.4 Define the Study Boundaries

The study will be limited to the residual solids that are targeted for removal in the Dewatering Pit (see Figure 1 for location). Material characteristics are not expected to change with time and therefore a single sampling event will be performed.

The Dewatering Pit consists of three bermed areas. The surface area of the bottom of the eastern pit measures approximately 23,150 square feet. The surface area of the western pit is approximately 15,100 square feet, and the surface area of the small southern pit is 3,500 square feet. The berms are approximately eight feet high except on the side of Interstate 86, where the berms vary in height from eight to twelve feet. The berms are constructed of native soil and gravel that was excavated from the interior of the pits during construction. The solids within these pits consists primarily of phosphate ore residuals and solids precipitated by pH adjustment of irrigation waters, which can be visually recognized by their gray color in contrast to the light brown-colored native soil.

2.5 Develop a Decision Rule

In terms of evaluating whether the materials would exhibit the Toxicity Characteristic when excavated during remedial action construction, the average characteristics of the material are important (material would be mixed both laterally and with depth by the excavation process). Therefore, a single composite sample will be collected from each of the three pits. The composite sample will be made of grab samples designed to represent the material in each pit, both laterally and vertically. The sampling is designed to represent the average characteristics in each of the three pits, and will be assessed using the TCLP test. If the TCLP leachate exceeds the concentrations shown in Table 2, the scope of the remedy will be revisited with EPA. If the concentrations are below the values shown in Table 2 (40 CFR 261.24), the excavated materials will be relocated to the gypsum stack, as specified in the Consent Decree Statement of Work. In addition, material will be tested for the characteristic of corrosivity (40 CFR 261.22). A solid waste exhibits the characteristic of corrosivity if a representative sample is aqueous and has a pH less than or equal to 2 or greater than or equal to 12.5, as determined by a pH meter using Method 9040B in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA

Publication SW-846, or if it is a liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm (0.250 inch) per year at a test temperature of 55 [deg]C (130 [deg]F) as determined by the test method specified in NACE (National Association of Corrosion Engineers) Standard TM-01-69 as standardized in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,". EPA has specified for the Dewatering Pit sampling that EPA Test Method 9040B will be used to determine whether the residual solids exhibit the characteristic of corrosivity.

Table 2
Toxicity Characteristic Concentrations

Constituent	Regulatory Level (mg/L)
Arsenic	5.0
Barium	100.0
Cadmium	1.0
Chromium	5.0
Lead	5.0
Mercury	0.2
Selenium	1.0
Silver	5.0

2.6 Specify Limits on Decision Errors

Multiple grab samples will be collected to provide a single composite sample to accurately describe the average characteristics within each pit area. Inspections of the Dewatering Pit conducted on August 8, 2002 found that the residual solid material appears to be homogeneous and no layering was observed. Based on this and the origin of the residual material, variability in the material characteristics within each pit area is expected to be small. The analytical methods used to measure metals concentrations will provide quantitative data that are directly comparable to the concentrations that will serve as the basis for decision-making.

3.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

This section provides a description of the project organization, key personnel and responsibilities associated with the sampling event at the Dewatering Pit. The sampling effort is straight-forward and requires collection of just three samples, and therefore a large management structure is not required and a project management diagram is not necessary.

The J.R. Simplot Company field manager for the sampling event will be Mr. Dale Reavis. He will be responsible for coordination with the regulating Agencies, for oversight of the sample collection activities and for identifying and documenting non-conformances with this SAP. Ms. Jeanene Benson, Environmental Specialist, of the J.R. Simplot Company will collect the samples.

Data validation and data assessment will be performed by Ms. Cathy Shuggarts of MFG, Inc. Because only three samples are being collected there will be no database management and audits associated with the project.

Samples will be analyzed by SVL Analytical, located in Kellogg, Idaho. Mr. Paul E. Duerksen, the Quality Assurance Coordinator, will be responsible for oversight of the analyses.

4.0 SAMPLE COLLECTION APPROACH

This section describes the general sampling approach. Details of sample collection procedures are provided in Section 5.1. As described above, the Dewatering Pit consists of three bermed areas (Figure 1). In each bermed area, a single composite sample will be collected to be representative of the residual solids.

In the West Dewatering Pit grab samples will be collected from five locations (Figure 1). Inspection of this area indicates that the depth of residual solids is around five inches deep in the middle and less deep toward the edges. The material is loose, such that it is not possible to get a clean side cut to stand vertically. The material should therefore be relatively easy to sample. At each location a grab sample will be collected from the entire depth of residual solids. The five grab samples will be combined into one composite for the West Dewatering Pit.

In the East Dewatering Pit, the sampling approach will be the same as described above for the West Dewatering Pit. Sample collection locations are shown on Figure 1. Inspection of this area indicates that the residual solids are approximately 12 to 14 inches deep in the middle of the pit.

The South Dewatering Pit is a much smaller area and inspection found that residual solids are typically half an inch deep or less. Therefore, grab samples will be collected from three locations in this pit (see Figure 1) and combined to one composite sample. A summary of all samples to be collected is shown in Table 3.

Table 3
Summary of Samples to be Collected

Investigative	Number of Samples
Western Pit	1 composite
Eastern Pit	1 composite
Southern Pit	1 composite
Quality Control	
Eastern Pit	1 composite duplicate

5.0 FIELD AND LABORATORY METHODS

Field methods for collection of the residual solids samples are described in this section along with a listing of the laboratory methods that will be used.

5.1 Sample Collection

This section provides details of how samples will be collected.

Equipment

The following equipment will be required for sample collection:

- Collection containers – glass containers
- Stainless Steel Spade and Scoopula - for shallow excavations and sample collection.
- Stainless Steel Composting Bowl – for collecting the grab samples for compositing. Samples will be mixed in this bowl..
- Latex Gloves – for personal protection and to prevent cross-contamination of samples. Disposable, powderless.
- Field clothing and Personal Protective Equipment – as specified in the Health and Safety Plan.
- Wipes – disposable, paper or baby wipes. Used to clean and decontaminate marker flags.
- Cooler with Blue Ice- for sample transportation to analytical lab.
- Tarp – for decontamination area.
- Field notebook – a bound book used to record progress of sampling effort and record any problems and field observations during sampling.
- Permanent marking pen – used as needed during sampling and for documentation of field logbooks and data sheets.
- Measuring tape or wheel – used in the identification of sampling locations within each pit.
- Trash Bag – used to dispose of gloves and wipes.

Soil Sample Location Identification

The sampling locations are shown on Figure 1. The locations will be identified using a measuring wheel or tape and will be marked using marker flags.

Shallow Excavations

The residual solids are relatively shallow (5 inches deep in the West Dewatering Pit, 12 to 14 inches in the East Dewatering Pit and half an inch or less in the South Dewatering Pit) and are loose. Therefore, shallow excavations will be made in the west and east pits using a spade.

Sample Collection

Material will be collected from the side-walls of shallow excavations in the Western and Eastern Dewatering Pits. In the South Dewatering Pit, the residual solids are present at less than an inch depth and so samples will be collected directly through the surface. Overall, at least 1,000 grams of grab samples should be collected from each pit for the composite. At each location a grab sample will be collected to represent the entire depth of the material, which is visually different from the underlying soil. In shallow excavations this will be achieved by collecting equal volumes of material from each depth interval. The total volume of sample collected at a particular location will be proportional to the total depth of the material. For example, at a location within a given pit where the depth of solids is 12 inches, twice as much sample will be collected as a different location in the same pit where the depth is 6 inches. The relative proportions of the grab samples will be determined by the sampler after excavations are made and depths of residual solids have been measured.

Because the residual solids are loose, samples will be collected using a stainless steel scoopula and placed directly into a stainless steel bowl. Once all samples from an individual pit are collected the sample will be thoroughly mixed in the bowl and at least 500 grams placed into a glass sample container.

Immediately following sample collection, samples will be labeled and prepared for shipment to the analytical laboratory (see SOP No. 2 in Appendix A). Each sample will be assigned a unique sample identification number. Sample identification numbers will have several components, as explained using the following example:

EMF-DWP-1002-W1

The first component, EMF, stands for "Eastern Michaud Flats" and indicates that samples are being collected as part of the Superfund Project; "1002" is the month and year the samples were collected, "DWP" stands for Dewatering Pit; and W1 indicates that the sample was the first sample from the west pit ("S" and "E" will be used for the south and east pits respectively). In addition samples will be labeled with the date/time of collection.

Field activities will be documented in accordance with SOP No. 1 (Appendix A). Sample preservation requirements are shown on Table 4.

Table 4
Analytical Methods, Sample Preservation and Holding Times

Parameter	Analytical Method	Target Method Detection Limit (MDL) mg/L	Preservation and Storage Requirements	Holding Time from Field Collection to TCLP Extraction (days)	Holding Time from Preparative Extraction to Determination Analysis (days)
Arsenic	EPA 1311/6010B	0.040	4 ±2 °C	180	180
Barium	EPA 1311/6010B	0.003	4 ±2 °C	180	180
Cadmium	EPA 1311/6010B	0.003	4 ±2 °C	180	180
Chromium	EPA 1311/6010B	0.010	4 ±2 °C	180	180
Lead	EPA 1311/6010B	0.040	4 ±2 °C	180	180
Mercury	EPA 1311/7470A	0.0002	4 ±2 °C	28	28
Selenium	EPA 1311/6010B	0.05	4 ±2 °C	180	180
Silver	EPA 1311/6010B	0.005	4 ±2 °C	180	180
Corrosivity	EPA 9040B *		None.		

* Analyze as soon as possible after collection.

If sampling equipment is to be re-used, follow the decontamination procedures outlined in the Standard Operating Procedure (SOP No. 16; Appendix A) will be followed. There is no need to decontaminate between locations for subsamples collected for a single composite sample.

5.2 Laboratory Methods

Analyses will be performed by SVL Analytical Inc. in Kellogg, Idaho. The analytes, laboratory methods, and preservation requirements are listed on Table 4.

6.0 QUALITY ASSURANCE AND QUALITY CONTROL

The procedures listed in this section will ensure that the data are of appropriate quality to meet the data needs of this plan.

6.1 Data Uses

As noted in Section 2.0, the data resulting from this sampling will be used to determine if the currently-specified remedial action for the Dewatering Pit to excavate residual solids and dispose of them on the gypsum stack is appropriate. This will be achieved by TCLP testing and comparing the metals concentrations with the regulatory levels shown in Table 2 and corrosivity testing in accordance with 40 CFR 261.22.

6.2 Field Quality Control Procedures

Field quality control will entail decontamination of field sampling equipment and adherence to this plan and SOPs (Appendix A). These elements are described in Section 5.0. In addition, a duplicate sample will be collected from the East Dewatering Pit. The sample will be obtained from the same locations and by the same method as the routine sample. The relative percent difference requirement for duplicate results is less than 50 percent. If this difference is exceeded, concentrations will be flagged as estimated. There is no established relative percent difference criterion for duplicate soil samples and often sampling and plans call for their collection and analysis without a specified limit on the difference. A 50 percent difference has been established for this project by the MFG Chemist based on experience on CERCLA soil sampling projects at numerous metals-contaminated sites.

6.3 Laboratory Quality Control

The sample collection methods and analytical methods were selected to ensure that laboratory analysis is sufficiently sensitive, accurate and precise to meet the data needs for this plan. The commercial laboratory used to provide the analyses listed in Table 3 will perform the requested analyses in accordance with the referenced EPA methods and will operate under an internal Quality Assurance

Plan (attached as Appendix B). The laboratory will provide the following information to support their analysis results for each parameter analyzed:

- Sample preparation method reference;
- Analytical method reference;
- Method detection limit;
- Reporting or practical quantitation limit;
- Units
- Shipment temperature;
- Analysis date;
- Laboratory control standard recovery;
- Matrix spike (MS) recovery;
- Matrix spike duplicate (MSD) recovery;
- MS/MSD relative percent difference;
- Initial and continuing calibration verification results (dated);
- Chain of custody record; and
- Sample condition upon receipt.

The accuracy of laboratory analysis results will be evaluated using the results for recovery from laboratory control samples (LCSs) and MS samples. The precision of laboratory analyses will be evaluated using results from duplicate analyses of MS samples. Criteria for acceptance of laboratory data for specific data uses are shown in Table 5.

Table 5
Laboratory Control Limits

Metal	Aqueous LCS	Soil LCS	CCV	Method Blank	Aqueous Matrix Spike	Soil Matrix Spike	Relative Percent Difference
Arsenic	±15%	±20.8%	±10%	<0.01 mg/L	±25%	±25%	±20%
Cadmium	±15%	±19.2%	±10%	<0.002 mg/L	±25%	±25%	±20%
Lead	±15%	±22.5%	±10%	<0.005 mg/L	±25%	±25%	±20%
Mercury	±10%	±34.2%	±10%	<0.0002 mg/L	±25%	±25%	±20%
Silver	±15%	±45.2%	±10%	<0.005 mg/L	±25%	±25%	±20%
Barium	±15%	±20.4%	±10%	<0.002 mg/L	±25%	±25%	±20%
Chromium	±15%	±22.6%	±10%	<0.006 mg/L	±25%	±25%	±20%
Selenium	±15%	±27.8%	±10%	<0.01 mg/L	±25%	±25%	±20%

6.4 Project Documentation

A field log will be maintained to record sample collection activities. Whenever a sample is collected or a measurement is made, a detailed description of the sample location and any additional observations will be recorded. The following minimum information will be recorded:

- Site location and sample collection locations;
- The name(s) of the sampling personnel;
- Time and date of the collecting event;
- Prevailing weather conditions; and
- Sampling or analyses problems.

6.5 Data Reduction and Validation

The analytical laboratory will report data by paper copy. Laboratory reports and associated field documentation will be copied and filed. The data will be evaluated in accordance with SOP No. 20 (Appendix A). The QA objectives are shown in Table 6.

Table 6
Quantitative Measurement Objectives

Accuracy	LCS Recovery = 80 to 120% MS Recovery = 70 to 130%
Precision	LCS Duplicate RPD < 25% MS Duplicate RPD < 25%
Completeness	95%

In general, the following steps will be taken to review the monitoring data:

- Chain of Custody forms and laboratory data sheets will be checked to verify that samples were analyzed within specified holding times. Samples which do not satisfy holding time and preservation requirements will be noted and the reliability of the data assessed.
- The accuracy of chemical data will be evaluated using results from LCS and MS samples prepared by the laboratory. The laboratory will calculate the percent recoveries for these results. If the recoveries are outside the limits presented in this plan, action will be taken by the laboratory to improve the precision of analytical results.
- Finally, all the data will be carefully reviewed for potential transcription errors, detection limit discrepancies (laboratory only), data omissions, and suspect or anomalous values. If such errors or deficiencies are found, the laboratory and/or field sampler will be contacted and the appropriate corrective action taken. The purpose of contacting the field sampler would be to check for the origination of transcript errors or data omissions. The corrective action will be recommended by the data reviewer and approved by the Simplot Field Manager (Dale Reavis). The action will be subject to Agency review and comment.

The data will be reviewed to confirm that the data meet the data quality objectives for data use. Any data not meeting the quality requirements of this plan will be flagged to identify them to data users and appropriately qualified. A list of data qualifiers is shown in Table 7.

Table 7
Qualifier Flag Definitions

FLAGS	DESCRIPTION
J	Analyte was present but reported value may not be accurate or precise
J+	Analyte was present by reported value may not be accurate or precise and there may be a high bias in the value reported (actual concentration may be lower than the reported result)
J-	Analyte was present but reported value may not be accurate or precise and there may be a low bias in the value reported (actual concentration may be higher than the reported result)
R	Data point has been rejected
U	This analyte was analyzed for but not detected at the specified detectability limit
UJ	This analyte was analyzed for but not detected, and the reported detectability limit is estimated

7.0 SCHEDULE AND REPORTING

The sampling event will take less than a day to complete. It is tentatively scheduled for Wednesday October 16, 2002. Samples will be shipped to the analytical laboratory on Thursday October 17 and a two-week turnaround time requested. The results are expected to be available by October 31, 2002.

Data will be provided in the monthly progress report, along with the validation report and any other documentation necessary to provide information about the sampling event and the results, as soon the data reduction and review described in Section 6.5 is completed. The reporting requirements will be in accordance with the Consent Decree (USEPA, 2002). It is expected that the review will take two weeks or less after the data are received from the laboratory. A summary report will also be included in the revised Dewatering Pit Remedial Action Work Plan. The report will include a description of the sampling event, the data and associated validation report and conclusions of the sampling event.

8.0 REFERENCES

- Bechtel. 1996. *Remedial Investigation Report for the Eastern Michaud Flats Superfund Site*. Bechtel Environmental, Inc. Prepared for FMC Corporation and the J.R. Simplot Company.
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- USEPA. 2002. *Consent Decree for Remedial Design/Remedial Action for the Simplot Plant Area at the Eastern Michaud Flats Superfund Site*. US EPA Region 10. May 9 2002.

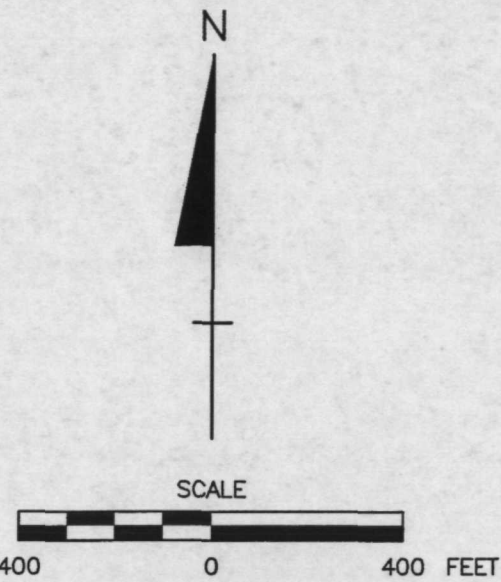
/

FIGURES

FIGURE



- LEGEND:**
- APPROXIMATE AREA OF RESIDUALS
 - APPROXIMATE SAMPLING LOCATIONS



SIMPLLOT PLANT AREA
EASTERN MICHAUD FLATS
SUPERFUND SITE
POCATELLO, IDAHO

DEWATERING PIT

FIGURE 1
DEWATERING PIT
SAMPLING LOCATIONS

PROJECT: 010121.4 DATE: AUGUST 2002
REV: BY: SCG CHECKED: ACK

MFG, Inc.
consulting scientists and engineers

RPFILED D:\010121\010121-35.dwg 010121.2 8/16/02 10:48 am
Xref: [none]
PLOT DATE: 8/16/02
Plot time: 10:59 am
Plot size: 11x17

APPENDIX A

APPENDIX A
STANDARD OPERATING PROCEDURES

MFG, Inc.

STANDARD OPERATING PROCEDURE No. 1

FIELD DOCUMENTATION

1.0 SCOPE AND APPLICABILITY

This Standard Operating Procedure (SOP) describes the protocol for documenting field activities. MFG field personnel shall document field activities on formatted field records and other appropriate data sheets. These formatted record and data sheets will be part of the MFG project file; all forms must be filled out carefully and completely by one of the personnel actually performing the field activities.

2.0 PROCEDURES

2.1 Daily Field Record

The MFG field representative will prepare a Daily Field Record form (Figure SOP-1-1) for each day of field work. Documentation on the multiple-page form will include:

- A. Project identification;
- B. Date;
- C. Time on job (beginning and ending time);
- D. Weather conditions;
- E. Activity description;
- F. List of personnel and visitors on site;
- G. Safety equipment used and monitoring performed;
- H. Waste storage inventory (if any);

- I. Chronological record of activities and events;
- J. Comments and variances from project work plan;
- K. Content of telephone conversations; and
- L. Signature of the MFG field representative.

The MFG field representative will document all details that would be necessary to recreate the day's activities and events at a later time, using as many additional sheets as necessary. The Daily Field Record also will be used to document field activities that may not be specified on other field record forms. Other activity-specific documentation requirements to be recorded on the Daily Field Record are discussed in the MFG Standard Operating Procedure for each activity.

3.0 DOCUMENTATION

3.1 Field Record Forms

In addition to the Daily Field Record, MFG field personnel will complete specific MFG field record forms applicable to the field activities being conducted. The procedures for completion of activity-specific field record forms are presented in the applicable MFG Standard Operating Procedures. MFG field record forms include:

- Daily Field Record (SOP No. 1);
- Chain-of-Custody Record and Request for Analysis (SOP No. 2);
- Field Log of Borehole by Cuttings (SOP No. 4);
- Field Log of Borehole by Coring (SOP No. 4);
- UST Closure Field Record (SOP No. 3);
- Well Construction Summary (SOP No. 6);
- Well Development Record (SOP No. 7);

- Geophysical Log (SOP No. 5);
- Water Level Monitoring Record (SOP No. 11);
- Pumping Test Record (SOP No. 14);
- Eh Data Sheet (SOP No. 13);
- Groundwater Sampling Record (SOP No. 12); and
- Surface Water Sampling Record (SOP No. 12).

Additional field record forms and applicable procedures may be created for project-specific activities, as necessary.

3.2 Records Management

All original field forms will be filed with the appropriate project's records.

4.0 QUALITY ASSURANCE

4.1 Form Review and Filing

All completed field forms will be reviewed by the Project Manager or project designated QA/QC reviewer. Any necessary corrections will be made in pen with a single-line strike out that is initialed and dated.


DAILY FIELD RECORD		DATE: _____	PAGE 1 of _____
Project No.: _____		Project Name: _____	
Location: _____	Time on Job: _____		<div style="display: flex; justify-content: space-between;"> AM PM </div> to: _____ <div style="display: flex; justify-content: space-between;"> AM PM </div>
Weather Conditions: _____			
Activity: _____			
PERSONNEL ON SITE			
Name	Company	Time In	Time Out
VISITORS ON SITE			
Name	Company/Agency	Time In	Time Out
PERSONAL SAFETY			
<input type="checkbox"/>	Protective Gloves	<input type="checkbox"/>	Hard Hat
<input type="checkbox"/>	Protective Boots	<input type="checkbox"/>	Safety Goggles/Glasses
<input type="checkbox"/>		<input type="checkbox"/>	Tyvek Coveralls (W/Y)
<input type="checkbox"/>		<input type="checkbox"/>	Air Purifying Respirator
Other Safety Equipment (describe): _____			
Monitoring Equipment: _____			
Field Calibration: _____			
WASTE STORAGE INVENTORY			
Container Type	Container ID	Description of Contents and Quantity	Location
Number of empty drums on Site: _____		Location of drums stored on Site: _____	
Signature of Field Representative: _____		Date: _____	
Notes: _		 <p>MFG, Inc. 4900 Pearl East Circle, Suite 300W Boulder, Colorado 80301-6118 (303) 447-1823 FAX: (303) 447-1836</p>	
Revision 5/25/00			

FIGURE SOP-1-1. DAILY FIELD RECORD

DAILY FIELD RECORD

(continued)

DATE:

PAGE ____ of ____

TIME

DESCRIPTION OF DAILY ACTIVITIES & EVENTS

COMMENTS & CHANGES FROM WORK PLAN

TIME

TELEPHONE CONVERSATION RECORD

Signature of Field Representative:

Revision 5/25/00



MFG, Inc.

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Boulder, Colorado 80301-6118

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FAX: (303) 447-1836

FIGURE SOP-1-1. DAILY FIELD RECORD

MFG, Inc.

STANDARD OPERATING PROCEDURE No. 2
SAMPLE CUSTODY, PACKAGING AND SHIPMENT

1.0 SCOPE AND APPLICABILITY

This Standard Operating Procedure (SOP) describes the protocol to be followed for sample custody, packaging and shipment. The procedures presented herein are intended to be general in nature. If warranted, appropriate revisions may be made when approved in writing by the MFG Project Manager.

This SOP applies to any liquid or solid sample that is being transported by the sampler, a courier or an overnight delivery service.

2.0 PROCEDURES

The objectives of this packaging and shipping SOP are: to minimize the potential for sample breakage, leakage or cross contamination; to provide for preservation at the proper temperature; and to provide a clear record of sample custody from collection to analysis.

2.1 Packaging Materials

The following is a list of materials that will be needed to facilitate proper sample packaging:

- X Chain-of-Custody Record forms (see Figure SOP-2-1);
- X Coolers (insulated ice chests);
- X Transparent packaging tape;
- X Zip-lock type bags (note: this is used as a generic bag type, not a specific brand name);

MFG, Inc.

- X Protective wrapping and packaging material;
- X Contained ice (packaged and sealed to prevent leakage when melted) or "Blue Ice";
and
- X Chain-of-Custody seals.

2.2 Sample Custody from Field Collection to Laboratory

After samples have been collected, they will be maintained under chain-of-custody procedures. These procedures are used to document the transfer of custody of the samples from the field to the designated analytical laboratory. The same chain-of-custody procedures will be used for the transfer of samples from one laboratory to another, if required.

The field sampling personnel will complete a Chain-of-Custody Record and Request for Analysis form (CC/RA form, Figure SOP-2-1) for each separate container of samples to be shipped or delivered to the laboratory for chemical or physical (geotechnical) analysis. Information contained on the triplicate, carbonless form will include:

1. Project identification;
2. Date and time of sampling;
3. Sample identification;
4. Sample matrix type;
5. Sample preservation method(s);
6. Number and types of sample containers;
7. Sample hazards (if any);
8. Requested analysis(es);
9. Requested sample turnaround time;
10. Method of shipment;
11. Carrier/waybill number (if any);

12. Signature of sampling personnel;
13. Name of MFG Project Manager;
14. Signature, name and company of the person relinquishing and the person receiving the samples when custody is being transferred;
15. Date and time of sample custody transfer; and
16. Condition of samples upon receipt by laboratory.

The sample collector will cross out any blank space on the CC/RA form below the last sample number listed on the part of the form where samples are listed. The samples will be carefully packaged into shipping containers/ice chests.

The sampling personnel whose signature appears on the CC/RA form is responsible for the custody of a sample from time of sample collection until the custody of the sample is transferred to a designated laboratory, a courier, or to another MFG employee for the purpose of transporting a sample to the designated laboratory. A sample is considered to be in their custody when the custodian: (1) has direct possession of it; (2) has plain view of it; or (3) has securely locked it in a restricted access area.

Custody is transferred when both parties to the transfer complete the portion of the CC/RA form under "Relinquished by" and "Received by." Signatures, printed names, company names, and date and time of custody transfer are required. Upon transfer of custody, the MFG sampling personnel who relinquished the samples will retain the third sheet (pink copy) of the CC/RA form. When the samples are shipped by a common carrier, a Bill of Lading supplied by the carrier will be used to document the sample custody, and its identification number will be entered on the CC/RA form. Receipts of Bills of Lading will be retained as part of the permanent documentation in the MFG project file.

2.3 Sample Custody Within Laboratory

The designated laboratory will assume sample custody upon receipt of the samples and CC/RA form. Sample custody within the analytical laboratory will be the responsibility of designated laboratory personnel. The laboratory will document the transfer of sample custody and receipt by the laboratory by signing the correct portion of the CC/RA form. Upon receipt, the laboratory sample custodian will note the condition of the samples, by checking the following items:

1. Agreement of the number, identification and description of samples received by comparison with the information on the CC/RA form; and
2. Condition of samples (no air bubbles in VOA containers; any bottle breakage; leakage, cooler temperature, etc.).

If any problems are discovered, the laboratory sample custodian will note this information on the "Laboratory Comments/Condition of Samples" section of the CC/RA form, and will notify the MFG sampling personnel or Project Manager immediately. The MFG Project Manager will decide on the final disposition of the problem samples.

The laboratory will retain the second sheet (yellow copy) of the CC/RA form and return the first sheet (white original) to MFG with the final laboratory report of analytical results. The original of the CC/RA form will be retained as part of the permanent documentation in the MFG project file.

A record of the history of the sample within the laboratory containing sample status and storage location information will be maintained in a logbook, or a computer sample tracking system, at the laboratory. The following information will be recorded for every sample access event:

1. Sample identification;
2. Place of storage;
3. Date(s) and time(s) of sample removal and return to storage;
4. Accessor's name and title;
5. Reason for access; and

6. Comments/observations (if any).

The laboratory will provide MFG with a copy of the logbook or computer file information pertaining to a sample upon request.

2.4 Sample Custody During Inter-Laboratory Transfer

If samples must be transferred from one laboratory to another, the same sample custody procedures discussed above will be followed. The designated laboratory person (sample custodian) will complete a CC/RA Record (MFG form or similar) and sign as the originator. The laboratory relinquishing the sample custody will retain a copy of the completed form. The laboratory receiving sample custody will sign the form, indicating transfer of custody, retain a copy, and return the original record to MFG with the final laboratory report of analytical results. The CC/RA Record will be retained as part of the permanent documentation in the MFG project file.

2.5 Packaging and Shipping Procedure

Be sure that all sample containers are properly labeled and all samples have been logged on the Chain-of-Custody Request for Analysis form (CC/RA, SOP-2-1) in accordance with the procedures explained above and in the MFG SOPs entitled WATER QUALITY SAMPLING and SOIL/SEDIMENT SAMPLING FOR CHEMICAL ANALYSIS.

All samples should be packed in the cooler so as to minimize the possibility of breakage, cross-contamination and leakage. Before placing the sample containers into the cooler, be sure to check all sample bottle caps and tighten if necessary. Bottles made of breakable material (e.g., glass) should also be wrapped in protective material (e.g., bubble wrap, plastic gridding, or foam) prior to placement in the cooler. Place each bottle or soil liner into two zip-lock bags to protect from cross-contamination and to keep the sample labels dry. Place the sample containers upright in the cooler. Avoid stacking glass sample bottles directly on top of each other.

If required by the method, samples should be preserved to 4°C prior to the analysis. Water ice or “blue ice” will be used to keep the sample temperatures at 4°C. The ice will be placed in two zip-lock bags if the samples are to be transported by someone other than the MFG sampler (e.g., a courier or overnight delivery service). Place the zip-lock bags of ice in between and on top of the sample containers so as to maximize the contact between the containers and the bagged ice. If the MFG sampler is transporting the samples to the laboratory shortly after sample collection, the water ice may be poured over and between the sample bottles in the cooler.

If there is any remaining space at the top of the cooler, packing material (e.g., styrofoam pellets or bubble wrap) should be placed to fill the balance of the cooler. After filling the cooler, close the top and shake the cooler to verify that the contents are secure. Add additional packaging material if necessary.

When transport to the laboratory by the MFG sampler is not feasible, sample shipment should occur via courier or overnight express shipping service that guarantees shipment tracking and next morning delivery (e.g., Federal Express Priority Overnight). In this case, place the chain-of-custody records in a zip-lock bag and place the bag on top of the contents within the cooler. Tape the cooler shut with packaging tape. Packaging tape should completely encircle the cooler, and a chain-of-custody seal should be signed and placed across the packaging tape, and across at least one of the opening points of the container.

Retain copies of all shipment records provided by the courier or overnight delivery service and maintain in the project's file.

2.6 Documentation and Records Management

Daily Field Records or a field notebook with field notes will be kept describing the packaging procedures and the method of shipments. Copies of all shipping records and chain-of-custody records will be retained in the project files.

3.0 QUALITY ASSURANCE

The Project Manager or designated QA reviewer will check and verify that documentation has been completed and filed per this procedure.

MFG. INC. COC No.

Seattle Office
19203 36th Avenue W
Suite #101
Lynnwood, WA 98036
TEL: (425) 778-8252
FAX: (425) 771-8842

PROJECT NO.: _____ PROJECT NAME: _____ PAGE: _____ OF: _____
 SAMPLER (Signature): _____ PROJECT MANAGER: _____ DATE: _____
 METHOD OF SHIPMENT: _____ CARRIER/WAYBILL NO.: _____ DESTINATION: _____

SAMPLES											ANALYSIS REQUEST											
Lab No.	Field Sample Identification	Sample Collection			Preservation				FILTRATION*	Containers				Constituents/Method					Handling			Remarks
		DATE	TIME	Matrix*	HCl	HNO ₃	H ₂ SO ₄	COLD		VOLUME (ml/oz)	TYPE*	NO.						HOLD	RUSH	STANDARD		
					TOTAL NUMBER OF CONTAINERS						LABORATORY COMMENTS/CONDITION OF SAMPLES										Cooler Temp:	

RELINQUISHED BY:			DATE	TIME	RECEIVED BY:		
SIGNATURE	PRINTED NAME	COMPANY			SIGNATURE	PRINTED NAME	COMPANY

KEY:
Matrix: AQ - aqueous NA - nonaqueous SO - soil SL - sludge P - petroleum A - air OT - other

Containers: P - plastic G - glass T - teflon B - brass OT - other Filtration: F - filtered U - unfiltered

DISTRIBUTION: PINK: Field Copy YELLOW: Laboratory Copy WHITE: Return to Originator

FIGURE SOP-2-1. CHAIN-OF-CUSTODY RECORD AND REQUEST FOR ANALYSIS

MFG, Inc.

STANDARD OPERATING PROCEDURE No. 16

EQUIPMENT DECONTAMINATION

1.0 SCOPE AND APPLICABILITY

This Standard Operating Procedure (SOP) describes the methods to be used for the decontamination of all reusable field equipment which could become contaminated during use or during sampling. The equipment may include split spoons, bailers, trowels, shovels, hand augers or any other type of equipment used during field activities.

Decontamination is performed as a quality assurance measure and a safety precaution. It prevents cross contamination between samples and also helps to maintain a clean working environment.

Decontamination is achieved mainly by rinsing with liquids which may include: soap and/or detergent solutions, tap water, distilled weak acid solution, and/or methanol or other solvent. Equipment may be allowed to air dry after being cleaned or may be wiped dry with chemical-free towels or paper towels if immediate re-use is necessary.

At most project sites, decontamination of equipment that is re-used between sampling locations will be accomplished between each sample collection point. Waste produced by decontamination procedures, including waste liquids, solids, rags, gloves, etc., should be collected and disposed of properly, based upon the nature of contamination. Specific details for the handling of decontamination wastes are addressed in the MFG SOP entitled STORAGE AND DISPOSAL OF SOIL, DRILLING FLUIDS AND WATER GENERATED DURING FIELD WORK or may be specified by a project plan.

2.0 PROCEDURES

2.1 Responsibilities

It is the responsibility of the field sampling coordinator to ensure that proper decontamination procedures are followed and that all waste materials produced by decontamination are properly managed. It is the responsibility of the project safety officer to draft and enforce safety measures which provide the best protection for all persons involved directly with sampling and/or decontamination.

It is the responsibility of any subcontractors (i.e., drilling contractors) to follow the proper, designated decontamination procedures that are stated in their contracts and outlined in the Site-Specific Health and Safety Plan. It is the responsibility of all personnel involved with sample collection or decontamination to maintain a clean working environment and ensure that any contaminants are not negligently introduced to the environment.

2.2 Supporting Materials

1. Cleaning liquids: soap and/or detergent solutions (Alconox, etc.), tap water, distilled water, methanol, weak nitric acid solution, etc.
2. Personal protective safety gear as defined in the Site-Specific Health and Safety Plan.
3. Chemical-free towels or paper towels.
4. Disposable, nitrile gloves.
5. Waste storage containers: drums, boxes, plastic bags, etc.
6. Cleaning containers: plastic and/or stainless steel pans and buckets.
7. Cleaning brushes.
8. Aluminum foil.

2.3 Methods

The extent of known contamination will determine the degree of decontamination required. If the extent of contamination cannot be readily determined, cleaning should be done according to the assumption that the equipment is highly contaminated. Decontamination procedures should account for the types of contaminants known or suspected to be present. In general, high levels of organic contaminants should include an organic solvent wash step, and high levels of metals contamination should include a weak acid rinse step.

The procedures listed below constitute the full field decontamination procedure. If different or more elaborate procedures are required for a specific project, they may be specified in sampling and analysis or work plan. Such variations in decontamination protocols may include all, part or an expanded scope of the decontamination procedure stated herein.

1. Remove gross contamination from the equipment by dry brushing, and rinse with tap water.
2. Wash with soap or laboratory-grade detergent solution.
3. Rinse with tap water.
4. Rinse with methanol (optional, for equipment potentially contaminated by organic compounds).
5. Rinse with acid solution (optional, for equipment potentially contaminated by metals).
6. Rinse with distilled or deionized water.
7. Repeat entire procedure or any parts of the procedure as necessary.
8. Air dry.

Decontaminated equipment should be stored in sealable containers, such as Ziplock-type plastic bags or cases or boxes with lids.

2.4 DOCUMENTATION

Field notes will be kept describing the decontamination procedures followed. The field notes will be recorded according to procedures described in the MFG SOP entitled FIELD DOCUMENTATION.

3.0 QUALITY CONTROL

To assess the adequacy of decontamination procedures, field rinsate blanks may be collected. The specific number of rinsate blanks will be defined in a sampling and analysis or work plan or by the MFG project manager. In general, at least one field rinsate blank should be collected per sampling event or per day.

Rinsate blanks with elevated or detected contaminants will be evaluated by the Project Manager, who will relay the results to the site workers. Such results may be indicative of inadequate decontamination procedures that require corrective actions (e.g., retraining).

MFG, Inc.

STANDARD OPERATING PROCEDURE No. 20

DATA EVALUATION

1.0 SCOPE AND APPLICABILITY

This Standard Operating Procedure (SOP) describes a protocol for the evaluation of results generated through laboratory analysis of environmental samples. Included in this protocol are procedures to evaluate the completeness, accuracy and precision of data. The data evaluation procedure provided herein may be used to evaluate data quality with respect to project-specific quality objectives or goals. The quality control limits specified by project depend on the data uses and resultant data quality objectives. This SOP generally follows validation guidelines established by the EPA, however it is not meant to be used if an alternative validation protocol, such as USEPA National Functional Guidelines for Organic Data Review, is specified as required for a project.

A project's Quality Assurance Project Plan (QAPP) and/or other planning documents (e.g., Work Plan, Sampling and Analysis Plan, etc.) must be reviewed before this SOP is used to evaluate data. The individual performing the data evaluation shall be familiar with the analytical methods and other procedures used for that project. Familiarity with laboratory quality control requirements for the analyses performed and a project's reporting/documentation requirements is also necessary before this procedure may be used.

2.0 PROCEDURES

A Data Evaluation Checklist is attached to this SOP. This form, or a similar project-specific form, should be completed to document the data evaluation process and summarize the evaluation results. The procedures for completing the attached Data Evaluation Checklist are as follows:

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1. Review project planning documents (e.g., sampling and analysis plan, quality assurance plan) and note the planned analysis methods, detection limits, quality control samples and quality control limits specified for each sample type.
2. Check to see if copies of the Chain-of-Custody records (COCs) are present. If present, verify that all necessary information was provided on each COC and that all necessary signatures are present. Verify that all samples listed on the COCs were analyzed for the appropriate parameters. Note any problems written on the COCs by either the laboratory or the sampler.
3. Briefly summarize the laboratory's narrative, if present. If notes or comments were written on individual data pages, summarize these also.
4. Review temperature and preservation information to verify that samples were properly preserved.
5. For each sample and each parameter, verify that the analyses were performed within the appropriate holding time. If the specific dates of analysis are not provided, check the date the report was issued. This may be helpful if the report date is within the sample holding times (i.e., most metals have a 6-month hold time, and reports are usually issued prior to 6 months indicating the analyses were performed within hold times).
6. Verify that the field QC samples specified in the Work Plan, SAP or QAPP for the project have been collected at the correct frequency.
7. Review the results of all blanks, including field QC samples (equipment blanks, trip blanks) and laboratory method blanks. If an analyte was detected in a blank, check to see if any sample results associated with that blank were within five times the blank concentration. If an associated sample result is less than five times the blank concentration, the result is potentially biased high and may be considered non-detect. If an analyte is detected in the method blank and another type of blank, first apply this five times rule using the method blank concentration. This may result in the other blank being considered non-detect due to method blank contamination.
8. Check the matrices, units and detection or reporting limits for each result to verify that they are reported correctly and meet any project-specific requirements. Contact the laboratory regarding any discrepancies.
9. If organic analyses were performed, check the surrogate recoveries for each sample to ensure that the recoveries were within the laboratory's control limits. If a surrogate recovery is outside of the control limits, the associated sample data may be biased and should be considered estimated results.

10. Review all LCS (and LCSD if available) recoveries and verify that they were within the project-specified control limits. If project-specific control limits are not provided, use the method control limits or laboratory's control limits. If an LCS recovery was above the control limits, the associated data are potentially biased high, and if the LCS recovery was below the control limits the associated data are potentially biased low. If an LCS and an LCSD were analyzed, compare the LCS/LCSD RPD to the appropriate control limit. An RPD outside of the control limits indicates poor analytical precision. LCS recoveries and LCS/LCSD RPDs outside of control limits should be discussed with the laboratory so that they can take corrective actions.
11. Review all MS (and MSD if available) recoveries and verify that they were within the project-specified control limits. If project-specific control limits are not provided, use the method control limits or laboratory's control limits. If an MS recovery was above the control limits the associated data are potentially biased high due to matrix effects, and if the MS recovery is below the control limits the associated data are potentially biased low due to matrix effects. MS recoveries consistently outside of control limits should be discussed with the lab to determine if corrective actions are necessary. If an MS and an MSD were analyzed, compare the MS/MSD RPD to the appropriate control limit. An RPD outside of the control limits indicates poor precision for the matrix type (e.g., surface water).
12. If an analytical duplicate was analyzed, calculate the RPD and compare this to the project-specified control limits. If a project-specific control limit is not available, use the method control limits or the laboratory's control limits. However, if one or both of the results are less than five times the detection limit, use ± 2 times the detection limit as the control limit. If an RPD is outside of the control limits, the associated data should be considered estimated values due to poor analytical precision.
13. If field duplicates were analyzed, calculate the RPD for each parameter and compare the RPDs to project-specified control limits. If project-specific control limits are not available, use 30 percent for aqueous samples and 50 percent for soil samples. However, if one or both of the results are less than five times the detection limit, use ± 2 times the detection limit as the control limit. If an RPD is outside of the control limits, the associated data should be considered estimated due to poor field and/or analytical precision.
14. Calculate the project completeness (see Section 4.0). Compare this number to the project completeness goal.
15. Comments: Provide a brief summary of the accuracy, precision and completeness of the data set, including a discussion of data usability. Definitions of accuracy, precision and completeness are provided in Section 4.0. Discuss any QC that is

outside of the specified control limits and identify any samples that have been affected.

2.1 Documentation

A Data Evaluation Checklist (attached), or similar form, should be completed to document the evaluation process and evaluation results. These checklists should be provided to the MFG Project Manager and included in the project's laboratory results file.

3.0 QUALITY ASSURANCE/QUALITY CONTROL

Definitions of accuracy, precision and completeness and methods for computing their measures are provided below. Calculations should be checked by an independent reviewer.

3.1 Accuracy

Accuracy is the degree of difference between the measured or calculated value and the true value. Data accuracy or analytical bias is often evaluated by the analysis of surrogate standards for organic analyses, and laboratory control samples (LCS) and matrix spike (MS) samples for organic and inorganic samples, with results expressed as a percentage recovery measured relative to the true (known) concentration. The percentage recovery for surrogate standards and LCS samples is given by:

$$\text{Recovery (\%)} = \frac{A}{T} \times 100$$

where: A = measured concentration of the surrogate or LCS; and

T = known concentration.

The percentage recovery for MS samples is given by:

$$\text{Recovery (\%)} = \frac{A - B}{T} \times 100$$

where: A = measured concentration of the spiked sample;

B = concentration of unspiked sample; and

T = amount of spike added.

Blanks (i.e., equipment, field, trip, method) are often analyzed to quantify artifacts introduced during sampling, transport, or analysis that may affect the accuracy of the data. In addition, the initial and continuing calibration results may be reviewed to verify that the sample concentrations are accurately measured by the analytical instrument.

3.2 Precision

Precision is the level of agreement among repeated measurements of the same characteristic. Data precision or analytical error is assessed by determining the agreement among replicate measurements of the same sample and measurements of duplicate samples, which include MS/MSD samples, laboratory duplicate samples and field duplicate samples. The comparison is made by calculating the relative percent difference (RPD) as given by:

$$\text{RPD (\%)} = \frac{2(S_1 - S_2)}{S_1 + S_2} \times 100$$

where: S_1 = measured sample concentration; and

S_2 = measured duplicate concentration.

3.3 Completeness

Completeness is the percentage of valid measurements or data points obtained, as a proportion of the number of measurements or data points planned for the project. Completeness is affected by such factors as sample bottle breakage and acceptance/non-acceptance of analytical results.

Percentage completeness (C) is given by:

$$C (\%) = \frac{V}{P} \times 100$$

where: V = number of valid measurements/data points obtained; and
P = number of measurements/data points planned.

MFG, INC.
DATA EVALUATION CHECKLIST

Project No. : _____

Lab Project Numbers: _____

Sample Numbers or Lab Package Number:

Analytical Methods:

	<u>YES</u>	<u>NO</u>
1. Is a Work Plan, SAP, or QAPP available?	—	—
2. Chain of Custody Records:		
Are the COCs present?	—	—
Are the COCs complete and signed off?	—	—
Were all samples on the COCs analyzed?	—	—
Were any problems noted?	—	—
3. Was a project narrative available from the laboratory?	—	—
Were any problems noted?	—	—
4. Were all holding times met?	—	—
5. Was the frequency stated in the Work Plan, SAP or QAPP for field QC samples (duplicates, equipment rinsate, trip blanks) met?	—	—

	<u>YES</u>	<u>NO</u>
6. Were all equipment rinsate blank, trip blank, and method blank results ND?	—	—
7. Were all matrixes, units, and detection limits reported correctly?	—	—
8. Were all surrogate recoveries within control limits?	—	—
9. Were all LCS/LCSD spike recoveries and RPDs within control limits?	—	—
10. Were all MS/MSD spike recoveries and RPDs within control limits?	—	—
11. Were all analytical duplicate RPDs within control limits?	—	—
12. Were all field duplicate RPDs within control limits?	—	—
13. Was the project completeness goal met?	—	—

Comments:

Signed: _____

Date: _____

APPENDIX B

APPENDIX B

SVL ANALYTICAL INC. QUALITY ASSURANCE PLAN


SVL ANALYTICAL, INC.

Quality Assurance Plan

© SVL Analytical, Inc.
One Government Gulch • P.O. Box 929
Kellogg, ID 83837
Phone (800) 597-7144 Facsimile (208) 783-0891
<http://www.svl.net>



Laboratory Director's Signature



Date

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1. INTRODUCTION

Quality assurance and quality control measures are integral parts of the established quality system at SVL Analytical, Inc.

This manual describes the quality assurance program (QAP) at SVL Analytical, Inc. (SVL). This program has the unqualified support of SVL management as well as the agreement, acceptance and adherence of the laboratory staff.

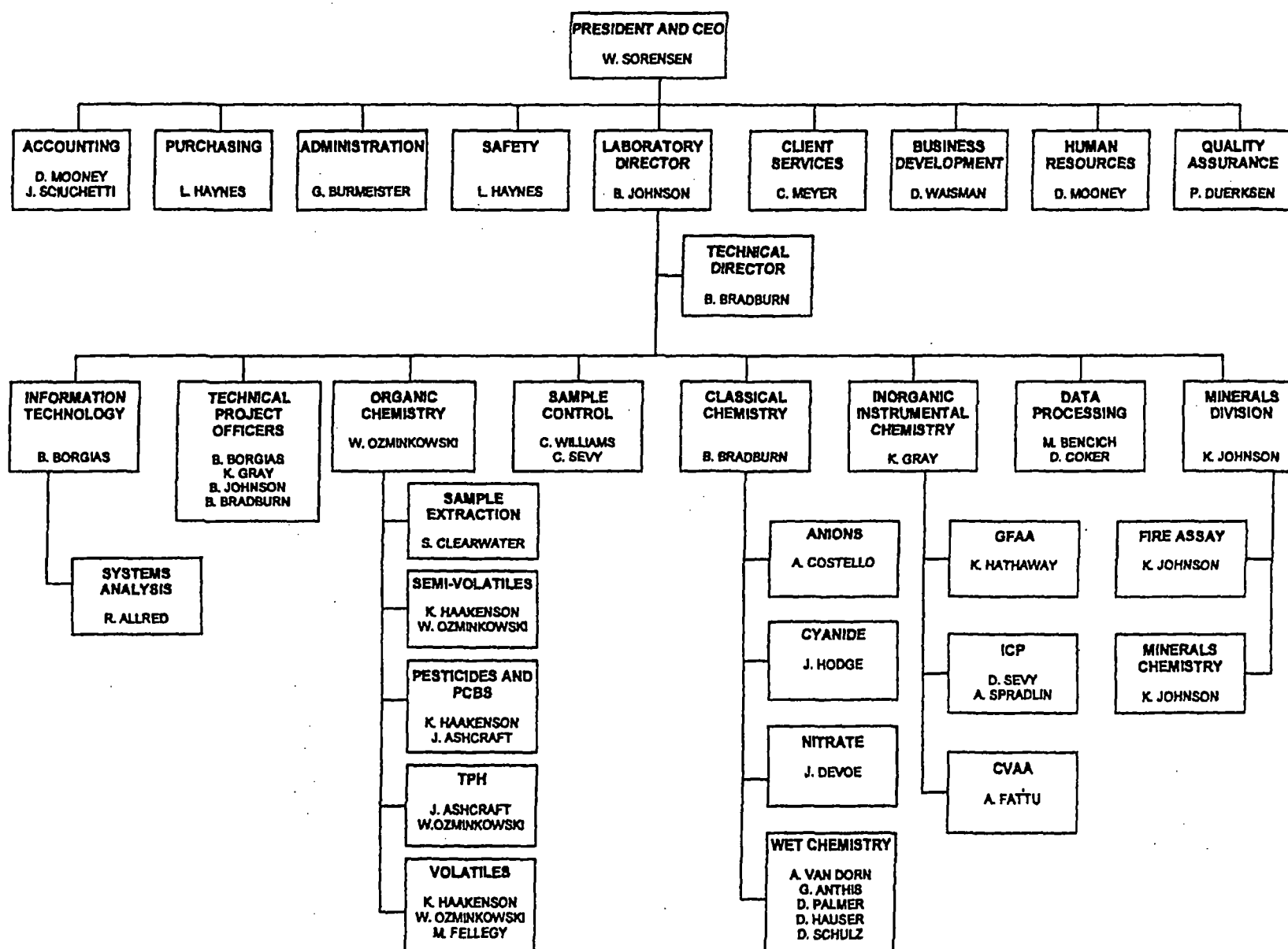
SVL is an analytical laboratory specializing in the performance of tests and parameters used in the characterization of environmental and mining samples. Since 1972, SVL has analyzed water, soil, sediment, sludge, oil, paint, rock, fish and other animal tissues, vegetation, air filters, and other sample types.

SVL occupies modern facilities specifically designed and organized to ensure an efficient mode of operation. The 25,000 square foot laboratory building has been modified to the specific needs of our large capacity analytical laboratory. Building access, security and safety features have been carefully considered. Access through the outside laboratory entrance and to internal areas is limited to laboratory and other essential personnel. Each laboratory division is plumbed and wired separately with easily accessible shut-off stations.

1.1 Organizational Chart

The organizational structure of SVL follows a traditional scheme of management with a few modifications. The President and CEO is at the top of the chain of command followed by the Laboratory Director. The Safety, Quality Assurance, Client Services, and Business Development divisions report directly to the CEO; all other lab employees report to the Laboratory Director. A complete organizational chart for SVL Analytical, Inc. is contained on the following page.

ORGANIZATIONAL CHART



1.2 Personnel

Position	Employee	Degree	Lab Experience
President	Wayne Sorensen	BS 1962	36
Laboratory Director	J. Blake Johnson	Ph.D. 1971	18
Technical Director	Bruce Bradburn	MS 1990	11
Supervisor Inorganic Instrumental Chemistry	Kirby Gray	BS 1972	18
Supervisor Organic Chemistry	Wendy Ozminkowski	BS 1997	4
Inorganic Instrument Operator (IC)	Ann Costello	BS 1971	16
ICP Spectroscopist	Anne L. Spradlin	BA 1983	17
Inorganic Instrument Operator (ICP)	Danny Sevy		15
Inorganic Instrument Operator (GFAA)	Kevin Hathaway		15
Inorganic Instrument Operator (CVAA)	Arlene Fattu	BS 1975	13
Classical Chemistry Department Analyst	James L. Hodge		30
Classical Chemistry Department Analyst	Alice Van Dorn		11
Classical Chemistry Department Analyst	Janice DeVoe	BS 1977	20
Classical Chemistry Department Analyst	Dean Palmer	BS 1979	5
Classical Chemistry Department Analyst	Gordon Anthis		13
Classical Chemistry Department Analyst	Debbie Schulz		1
Classical Chemistry Department Analyst	Kay Johnson		13
Classical Chemistry Department Chemist	David Hauser	BS 1996	1
Organic Chemistry Department Chemist	Kristine Haakenson	BS 1991	10
Organic Chemistry Department Chemist	Stephanie Clearwater	BS 2000	1
Organic Chemistry Department Analyst	Mark Fellegly		13
Organic Chemistry Department Analyst	Judy Ashcraft		33
Quality Assurance Coordinator	Paul Duerksen	BS 1977	21
Safety Director	Lee Haynes		12
Document Control Manager	Melba Bencich		14
Sample Control Manager	Carol Williams		14
Client Services Manager	G. Christine Meyer		
Business Development Manager	Dave Waisman	MS 1985	
Information Technology Manager	Brandan Borgias	Ph.D. 1985	22
Systems Analyst	Russell Allred		19
Accounts Receivable	Donella Mooney		
Accounts Payable	Joyce Sciuchetti		
Sample Receiving	Crystal Sevy		1
Document Processing and Reporting	Dee Coker		

1.3 Resumes

WAYNE R. SORENSEN

PROFESSIONAL EXPERIENCE:

- 1973 -
PRESENT **SVL Analytical, Inc. - Kellogg, ID**
President: Owner and founder of the laboratory. Administers company policies and formulates business strategies.
- OCT 1969 -
APR 1973 **The Bunker Hill Company - Kellogg, ID**
Supervised a large integrated mine, mill and smelter analytical laboratory and trained personnel.
- MAR 1968 -
OCT 1969 **Kennecott Copper, Ray Mines Division**
Chief Chemist: Supervised an assay lab, trained assayers for new analytical methods and conducted applied research.
- MAY 1965 -
MAR 1968 **Kennecott Copper, Western Mining Division Research Center**
Analytical Chemist: Analytical methods development and applied metallurgical research on copper.

EDUCATION:

- 1958 - 1962 **Utah State University - Logan, UT**
B.S. Chemistry (minor: mathematics, physics)
- 1965 **Salt Lake Trade Tech - Salt Lake City, UT**
Basic Industrial Statistics
- 1966 - 1967 **University of Utah - Salt Lake City, UT**
MBA program
- 1968 **Arizona State University - Tempe, AZ**
Modern Industrial Spectroscopy
- 1969 **Arizona State University - Tempe, AZ**
Creative Management

SVL ANALYTICAL, INC.

WAYNE R. SORENSON (continued)

PUBLICATIONS:

"A Study of Variables Affecting the Quality of Electrowon Copper" paper presented at the 1968 meeting of the Electrolytic Process Committee and the 1969 National AIME Conference.

PATENTS:

Electrolyte circulation system for an electrolytic cell.

SVL ANALYTICAL, INC.

J. BLAKE JOHNSON

PROFESSIONAL EXPERIENCE:

JAN 1990 - **SVL Analytical, Inc. Kellogg, ID**
PRESENT

Laboratory Director – Manages and directs the activities of the laboratory.

AUG 1989 - **Consultant - Spokane, WA**
JAN 1990

JUL 1979 - **Baroid Corporation - Houston, TX**
AUG 1989

Director of Exploration and Property Management – Managed and directed all geological investigations, worldwide, and managed all domestic production properties.

DEC 1978 - **Baroid Corporation - Houston, TX**
JUL 1979

Assistant Director of Exploration.

MAR 1973 - **NL Industries - Golden, CO**
DEC 1978

Chief Geochemist – Planned and implemented all geochemical investigations, worldwide.

FEB 1972 - **Geosensors - Spokane, WA**
MAR 1973

Geochemist – Investigated the relationships between airborne radiometric data and uranium deposits and petroleum reservoirs.

JUN 1969 - **Vanguard Exploration - Spokane, WA**
FEB 1972

Geochemist – Performed laboratory and field investigations as applied to mineral exploration.

EDUCATION:

1967 - **University of Idaho - Moscow, ID**
1969

Ph.D. Geology (minor in Chemistry)

1963 - **Whitworth College - Spokane, WA**
1967

B.S. Geology (minor in Chemistry)

SVL ANALYTICAL, INC.

J. BLAKE JOHNSON (continued)

PUBLICATIONS:

"Geochemistry of Belt Supergroup Rocks, Coeur d'Alene District, Shoshone County, Idaho"; unpublished Ph.D. dissertation, University of Idaho, April 1971.

"Studies on the Molecular Weight of Petroleum Asphaltenes Via the Vapor Pressure Osmometer"; paper presented of the Northwest Regional Meeting of the American Chemical Society, at Richland, Washington, June 1967.

SVL ANALYTICAL, INC.

G. CHRISTINE MEYER

PROFESSIONAL EXPERIENCE:

1993 -
PRESENT

SVL Analytical - Kellogg, ID

Client Services Manager – Secures commercial contracts; confers with technical staff and assigns project management for contracts. Primary in-house service representative, responsible for developing and distributing company literature to existing and potential clients.

JUN 1978 -
1993

SVL Analytical - Kellogg, ID

Project Manager, Minerals Division – Secured contracts with clients; supervised data generation and reporting to ensure quality control, expedited deliverables, and maintained customer service. Monitored all phases of Minerals Division projects.

1977 -
1978

Gary's Drug Center - Kellogg, ID

Pharmaceutical Aide – Assisted in dispensing prescriptions.

1975 -
1977

Shoshone School District #391 - Kellogg, ID

Substitute Teacher – Classroom instruction.

1975

Idaho State Department of Lands - Kingston, ID

Office Manager – Responsible for fire dispatch, clerical duties, payroll, and customer service.

EDUCATION:

1973 - 1974

North Idaho College - Coeur d'Alene, Idaho

Social services studies

1989

Customer service training seminar

1990

MS-DOS Computer class

PRESENTATIONS:

"Everything You Always Wanted to Know About Fire Assaying, But Were Afraid to Ask", Geological Society Meeting, 1992.

SVL ANALYTICAL, INC.

BRANDAN A. BORGAS

PROFESSIONAL EXPERIENCE:

1991 -
PRESENT **SVL Analytical, Inc. - Kellogg, ID**

Systems Manager, Computational Chemist – Responsibilities include developing and implementing SVL's Laboratory Information Management System (LIMS).

JUN 1989 -
MAR 1990 **Cray Research - San Ramon, CA**

Software Technical Support Analyst – Co-administrator of network composed of eight file servers and over 50 client work stations distributed throughout the western U.S. Unix (Sun OS and Cray UNICOS) operating systems experience.

1985 -
1989 **University of California, UCSF - San Francisco, CA**

Postdoctoral Scholar – Developed computer programs (FORTRAN) for the refinement and analysis of macromolecular structure. VAX, Sun, and Cray computers and VMS and UNIX operating systems.

1979 -
1985 **University of California, Berkeley - Berkeley, CA**

Graduate Research and Teaching Assistant – Dissertation on coordination isomers of highly efficient chelating agents for Fe. Teaching Assistant for X-ray Crystallography, and General, Analytical, and Biophysical Chemistry.

EDUCATION:

1979 -
1985 **University of California, Berkeley - Berkeley, CA**

Ph.D. Chemistry, 12/85 - Elected to Sigma Xi.

1975 -
1979 **Reed College - Portland, OR**

BA Chemistry/Physics, 5/79 - Elected to Phi Beta Kappa, 1979.

COMPUTER/PROFESSIONAL TRAINING

AUG 1996 **Competitive Edge Environmental Management Systems**

Introduction to ISO14000

APR 1995 **North Idaho College**

Intermediate Access

BRANDAN A. BORGIAS (continued)

FEB 1993 **Clarion Software**

Upgrading to Clarion Professional Developer 3.0.

MAR 1992 **ACS Short Course**

Laboratory Information Management Systems: From Problem Definition to System Evaluation.

AUG 1989 -
DEC 1989 **Cray Research**

Cray Y-MP Series System Architecture for Systems Analysts. Designing For Speed. Advanced Fortran Features and Optimization.

SUMMER
1988 **National Center for Supercomputing Applications (NCSA)**

NSF Summer Institute in Supercomputing.

SPRING 1988 **Pittsburgh Supercomputing Center**

NIH Biomedical Super-computing Workshop.

FALL 1979 **Reed College**

Fortran Programming.

PUBLICATIONS:

The Characterization & Structure of $[H_7O_3]^+[As(catecholate)_3]$ p-dioxane, B.A. Borgias, G.G. Hardin and K.N. Raymond, Inorg. Chem., (1986) **24**, 1057-1060.

Structural Chemistry of Gallium(III). Crystal Structures of $K_3[Ga(catecholate)_3] \cdot 1.5H_2O$ and $[Ga(benzohydroxamate)_3] \cdot H_2O \cdot CH_3CH_2OH$, B.A. Borgias, S.J. Barclay and K.N. Raymond, J. Coord. Chem. (1986) **15**, 109-123.

Isomerization and Solution Structures of Desferrioxamine B Complexes of Al and Ga, B.A. Borgias, A.D. Hugi and K.N. Raymond, Inorg. Chem. (1989), **28**, 3538-3545.

COMATOSE: A Method For Constrained Refinement of Macromolecular Structure Based on Two- Dimensional Nuclear Overhauser Effect Spectra, B.A. Borgias and T.L. James, J. Magn. Reson. (1988) **79**, 493-512.

2D NOE Complete Relaxation Matrix Analysis, B.A. Borgias and T.L. James, in NMR in Enzymology, **176** in Methods in Enzymology (N.J. Oppenheimer and T.L. James, eds.) Academic Press, Orlando, 169-183 (1989).

MARDIGRAS: Matrix Analysis of Relaxation for Discerning GeometRy of an Aqueous Structure, B.A. Borgias and T.L. James, J. Magn. Reson. (1990) **87**, 475-487.

SVL ANALYTICAL, INC.

DAVE WAISMAN

PROFESSIONAL EXPERIENCE:

APR 1993 - **SVL Analytical, Inc. - Kellogg, ID**
PRESENT

Business Development Manager

MAR 1988 - **Hecla Mining Company - Republic, WA**
APR 1993

Senior Exploration Geologist – Managed Exploration Office. Responsible for project cost tracking, drilling performance tracking, supervision of abandonment and reclamation of drill sites, design, budget and management of exploration efforts.

APR 1987 - **Golder Associates, Inc. - Seattle, WA**
NOV 1987

Geologist, Geotechnical Engineer – Well-site geologist for water monitoring wells at Hanford Nuclear Reservation. Well construction and QA review for Test and Operating Procedures for Basalt Waste Isolation Project.

MAY 1985 - **Consulting Geologist - Missoula, MT**
JAN 1987

Geological consulting in SW Montana for two major mining companies. Responsibilities included property evaluations, mapping and sampling. Experienced in reverse circulation and diamond drilling, and trace element geochemistry.

JUN 1984 - **Meridian Minerals Co. - Billings, MT**
JAN 1985

Geologist – Conducted precious metals reconnaissance in Belt and volcanic rocks of SW Montana, property submittal evaluations, trace element geochemistry.

EDUCATION:

1982 - **University of Montana, Missoula MT**
1985

MS Geology 1985

1975 - **Colorado State University, Fort Collins**
1979

BS Geology 1979

PUBLICATIONS:

Waisman, D.J., 1990, "Hecla's Golden Eagle Deposit, Republic Mining District", presented at the 96th Annual Northwest Mining Association Convention, 1990.

Waisman, D.J., 1992, "Minerals of the Black Pine Mine, Granite County, Montana", The Mineralogical Record, December 1992 (Vol. 23, No. 6, pp. 477-483).

SVL ANALYTICAL, INC.

M. LEE HAYNES

PROFESSIONAL EXPERIENCE:

NOV 1989 - **SVL Analytical, Inc. - Kellogg, ID**
PRESENT

Safety Director – Responsible for corporate health and safety policy, implementation of Chemical Hygiene Plan, waste disposal, and recycling.

1992 - **SVL Analytical, Inc. - Kellogg, ID**
PRESENT

Purchasing Officer – Responsible for purchasing, receiving, and verifying orders with vendors.

JAN 1991 - **Private Instructor**
PRESENT

Hazardous Materials, Hazardous Waste, and Emergency Response – Edwards & Associates

SEP 1978 - **Shoshone County Assessor's Office - Wallace, ID**
OCT 1989

Senior Appraiser, Director of Disaster Services

EDUCATION:

MAR 1997, **OSHA**
1998-99

40 Hour Hazardous Waste Operation & Emergency Response Course and Refreshers

1996 **UPS**

HM126F - Shipping Hazardous Materials

1996 AND **J.T. Baker**
1995

Laboratory Safety/Hazardous Chemicals Safety/Spill Response/Hazardous Chemicals

1989 **Emergency Management Institute**

Basic Course 3 and 4/Hazmat-Advanced course/PDS Capstone on National Security

1988 **Shoshone County Hospital**

Emergency Medical Technician

1988 **Emergency Management Institute**

Management Principles/Exercise Design

SVL ANALYTICAL, INC.

M. LEE HAYNES, cont.

1977 **Dale Carnegie Course**

Graduated 1977

1970 **Burroughs Computer School - Chicago, IL**

Diploma

1967 **Officers Candidate School - U.S. Army**

Commissioned - 2nd Lieutenant

SVL ANALYTICAL, INC.

KIRBY L. GRAY

PROFESSIONAL EXPERIENCE:

MAR 1987 - **SVL Analytical, Inc. - Kellogg, ID**
PRESENT

Inorganic Instrumental Chemistry Department Supervisor – Responsible for sample analysis by ICP, GFAA, FLAA, IC and CVAA.

SEP 1986 - **Radersburg Mining Co. - Toston, MT**
MAR 1987

Chemist: – Responsible for fire assay, FLAA, and sample preparation.

MAY 1984 - **Sunshine Mining Co. - Kellogg, ID**
MAY 1986

Chemist – Responsible for fire assay, FLAA, and classical chemistry.

AUG 1983 - **IDHW, State of Idaho - Kellogg, ID**
AUG 1983

Environmental Technician: –Operated X-ray fluorescence meter and collected soil samples.

MAY 1972 - **The Bunker Hill Co. - Kellogg, ID**
MAY 1982

Material Recovery Supervisor – Responsible for operation and maintenance of water treatment plant, sulfuric acid plant, baghouse, cadmium refinery, and electric reveratory furnace at a lead smelter.

EDUCATION:

SEP 1968 - **University of Idaho - Moscow, ID**
MAY 1972

B.S. Geological Engineering

SEP 1966 - **North Idaho College-Coeur d'Alene, ID**
JUN 1968

Engineering major

SVL ANALYTICAL, INC.

BRUCE BRADBURN

PROFESSIONAL EXPERIENCE

APR 2001 - **SVL Analytical, Inc. - Kellogg, ID**
PRESENT

Technical Director and Classical Chemistry Department Supervisor – Supervises inorganic analyst staff; responsible for ion chromatography, alkalinity, residues, turbidity, COD, fluoride, nitrate, nitrite, TKN, ammonia, cyanide, sulfur, sulfide, TCLP, SPLP, pH, flashpoint.

OCT 1997 - **Spokane Tribe of Indians – Spokane, WA**
APR 2001

Laboratory Manager – Supervised and trained staff; developed analytical methods; acquired EPA and WDOE certifications; wrote quality assurance plan; maintained laboratory instruments; reviewed data; analyzed samples by ICP-AES, CVAA, FAA, GFAA.

JUL 1995 - **SVL Analytical, Inc. – Kellogg, ID**
NOV 1997

Inorganic Chemist – Analyzed samples by ICP; GFAA, and FAA; developed computer programs for laboratory instrumentation

APR 1994 - **American Analytical Laboratories, Inc. – Seattle, WA**
JUL 1995

Laboratory Manager – Supervised staff chemists; developed analytical methods; maintained laboratory instrumentation; analyzed samples for pesticides and PCBs; conducted ICP-AES, GC, FAA, and IC analyses.

MAR 1991 - **Northwest Laboratories of Seattle – Seattle, WA**
NOV 1993

Chemist – Analyzed and certified raw materials; conducted ICP, GC, and FTIR analyses.

EDUCATION:

JULY 1996 **Jobin-Yvon Emission**

ICP Applications

1987 - 1990 **University of New Mexico – Albuquerque, NM**

M.S. Chemistry

1982 - 1987 **Western Washington University – Bellingham, WA**

B.S. Chemistry

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SVL ANALYTICAL, INC.

PAUL E. DUERKSEN

PROFESSIONAL EXPERIENCE:

DEC 1999 - **SVL Analytical, Inc. - Kellogg, ID**
PRESENT

Quality Assurance Coordinator – Coordinates quality assurance and training programs for the laboratory, maintains laboratory accreditations, writes standard operating procedures, calibrates equipment, reviews data, conducts audits, performs root cause analysis.

MAY 1998 - **Private Consultant – Silverdale, WA**
DEC 1999

Provided instruction in math and science courses

1995 - **Environmental Science Department, Washington State**
MAY 1998 **University – Richland, WA**

Graduate coursework in Environmental Science

OCT 1995 - **Northwest Technical Resources – Richland, WA**
FEB 1996

Quality Assurance Coordinator – Conducted audits of environmental laboratory; prepared analytical data packages; maintained training records.

MAR 1990 - **Hanford Environmental Health Foundation – Richland, WA**
MAY 1995

Quality Assurance Coordinator – Prepared and reviewed written procedures; conducted audits of industrial hygiene laboratory; conducted technical training courses; created document control and records handling systems; conducted audits of suppliers and sub-contractors

1987 - **Brown and Caldwell Analytical Laboratories – Glendale, CA**
MAR 1990

Quality Assurance Coordinator – Reviewed written procedures; prepared analytical data packages; coordinated performance evaluation sample program.

JAN 1983 - **Brown and Caldwell Analytical Laboratories – Glendale, CA**
1987

Chemist – Analyzed water, wastewater, soil, and waste samples for trace metals by inductively coupled plasma and graphite furnace atomic absorption spectroscopy; calibrated and maintained analytical instrumentation; directed work activities for two technicians.

NOV 1980 - **Jacobs Laboratories – Pasadena, CA**
JAN 1983

Chemist – Analyzed water, wastewater, soil, and waste samples for trace metals by atomic absorption spectroscopy; analyzed wastewater samples for cyanide, BOD, and COD.

EDUCATION:

1995 - **Washington State University – Richland, WA**

1998

40 credits coursework toward M.S. in Environmental Science

1995

Columbia Basin College – Richland, WA

Occupational Instruction

1993

Columbia Basin College – Richland, WA

Principles of Industrial Hygiene

1992

U.S. Department of Energy – Richland, WA

Introduction to Root Cause Analysis

1990

U.S. Department of Energy– Richland, WA

Auditing for Lead Auditors

1973 -

1977

University of California - Berkeley

B.S. Chemistry, June 1977

SVL ANALYTICAL, INC.

CAROL WILLIAMS

PROFESSIONAL EXPERIENCE:

JUL 1987 - **SVL Analytical, Inc. - Kellogg, ID**
PRESENT

Sample Control Manager – Manages job creation for incoming samples

JUN 1986 - **Shoshone Glass – Kellogg, ID**
JUL 1987

Monthly billing, procurement of supplies, scheduling

AUG 1982 - **First National Bank of North Idaho – Kellogg, ID**
MAY 1986

Bank Teller – Paying and receiving

AUG 1982 - **Silver Valley Laboratories–Osburn, ID**
MAY 1986

Lab Technician – Performed Cyanide analyses, and water and soil digestions

EDUCATION:

1979 - **North Idaho College – Coeur d'Alene, ID**
1981

General Studies

SVL ANALYTICAL, INC.

JAMES L. HODGE

PROFESSIONAL EXPERIENCE:

MAR 2001 - **SVL Analytical, Inc. - Kellogg, ID**
PRESENT

Classical Chemistry Department Analyst – Performs analysis of total and WAD Cyanide.

OCT 1995 - **Sunshine Mining and Refining Co. – Kellogg, ID**
MAR 2001

Analyzed samples for silver and gold by fire assay; conducted atomic absorption and ICP analysis

SEP 1993 - **Morrison Knuttdson Corporation**
OCT 1995

Conducted soil sampling; tested and maintained respirators; operated Bobcat loader

JUL 1991 - **Pintlar Corporation**
SEP 1993

Environmental and Health & Safety Manager—Responsible for health and safety; wrote health and safety plans; oversaw environmental and reclamation projects

JUN 1983 - **Bunker Limited Partnership**
JUL 1991

Laboratory Manager— Operated water treatment plant; oversaw environmental reclamation projects

JUN 1967 - **Bunker Hill Mining Co.**
OCT 1982

Laboratory Technician – Analyzed samples by fire assay; conducted wet chemical and atomic absorption analysis

EDUCATION:

APR 1993 **Urie Environmental Health, Inc.**

40-hour Hazardous Materials

JUL 1993 **MCS Environmental**

40-hour Asbestos Contractor Supervisor

APR 1993 **Urie Environmental Health, Inc.**

80-hour Industrial Hygiene

SVL ANALYTICAL, INC.

DEAN PALMER

PROFESSIONAL EXPERIENCE:

MAR 1996 - **SVL Analytical, Inc. - Kellogg, ID**
PRESENT

Classical Chemistry Department Analyst – Prepares water samples for analysis by ICP and GFAA (extracts and distillates) using SW-846 and EPA 200 series methods.

1983 - **Northern States Power Company - Welch, MN**
1994

Prairie Island Nuclear Plant Training Center, Production Engineer – Instruction of employees in the areas of math and physics as well as general employee training. Developed and taught course on site orientation, power plant fundamentals, industrial safety, radiological protection and respirator use.

1980 - **Kerr-McGee Nuclear - Grants, NM**
1982

Associate Mechanical Engineer. – Design and modification of mine mechanical equipment such as pumping, hydraulics, noise abatement, hoisting.

EDUCATION:

1969 - **North Dakota State University - Fargo, ND**
1972

B.S. Social Science - Secondary Ed; Minor - Mathematics

1976 - **South Dakota School of Mines and Technology - Rapid City, SD**
1979

B.S. Mechanical Engineering

SVL ANALYTICAL, INC.

JANICE B. DeVOE

PROFESSIONAL EXPERIENCE:

MAR 1990 - **SVL Analytical, Inc. - Kellogg, ID**
PRESENT

Classical Chemistry Department Analyst – Conducts Nitrate, Nitrite, and Ammonia analyses by Autoanalyzer, experienced in Chloride, Sulfate, Nitrate, Nitrite, and Fluoride analyses by ion chromatography and in analysis for Alkalinity, COD, and Phenolics

SEP 1980 - **Ferry County Memorial Hospital - Republic, WA**
MAR 1984

Medical Technician

NOV 1979 - **Good Samaritan Hospital - Phoenix, AZ**
JUN 1980

Medical Technician

AUG 1978 - **Ferry County Memorial Hospital- Republic, WA**
AUG 1979

Medical Technician

AUG 1977 - **Harris Laboratories - Lincoln, NE**
JUL 1978

Laboratory Technician

EDUCATION:

JAN 2001 **OI Corporation**

Operation of FS-3000 Auto-analyzer

1973 - **Fort Lewis College - Durango, CO**
1977

B.S. Biology

SVL ANALYTICAL, INC.

ALICE VAN DORN

PROFESSIONAL EXPERIENCE:

MAY 1990 - **SVL Analytical, Inc. - Kellogg, ID**
PRESENT

Classical Chemistry Department Analyst – Conducts TDS, TSS, TVS, pH, Turbidity, and Conductivity analyses; digests samples for metals analysis; air filter monitoring and digestions.

EDUCATION:

1970 **Green River Community College - Auburn, WA**

General Studies

1970 - **Southwestern Oregon Community College - Coos Bay, OR**
1972

AA Business Science; including Biology course work.

SVL ANALYTICAL, INC.

GORDON ANTHIS

PROFESSIONAL EXPERIENCE:

JUL 1988 - SVL Analytical, Inc. - Kellogg, ID
PRESENT

Classical Chemistry Department Analyst – Conducts TCLP and SPLP extractions, and meteoric water mobility studies; assists in sample receipt and chain-of-custody.

1986 - 1988 U.S. Forest Service – Bonners Ferry
SEASONAL

Fought forest fires; planted trees

1986 - 1988 Coeur d'Alene Tree Nursery – Coeur d'Alene, ID
SEASONAL

Harvested and sorted trees

SEP 1985 - External Line – Mullan, ID
NOV 1985

Flagger for road crew

SEP 1984 - Astoria Oil Services–Astoria, OR
JUL 1985

Building construction, framing, sheet rock.

EDUCATION:

1999 North Idaho College – Coeur d'Alene, ID

Course work in Algebra, Computer Programs

1998 Kellogg North Idaho College – Kellogg, ID

Windows 95

1997 Edwards & Associates–Wallace, ID

Hazardous Materials and Hazardous Waste

1983 - North Idaho College–Kellogg, ID
1984

Diesel Mechanics

SVL ANALYTICAL, INC.

DAVID HAUSER

PROFESSIONAL EXPERIENCE:

AUG 2001 - SVL Analytical, Inc. – Kellogg, ID
PRESENT

Classical Chemistry Department Chemist – Analyzes samples for Fluoride, Flashpoint, Specific Conductivity, Hardness, Phenols, and Phosphate; operates LECO instrument to analyze samples for ABA and Sulfur Forms

AUG 1997 - North Idaho Fitness – Coeur d'Alene, ID
AUG 2000

Developed training and nutrition programs for customers; assessed customer progress

EDUCATION:

1993 - University of Idaho – Moscow, ID
1996

B.S. Secondary Education

1979 - North Idaho College – Coeur d'Alene, ID
1993

A.A.S. Secondary Education

SVL ANALYTICAL, INC.

MARK FELLEGY

PROFESSIONAL EXPERIENCE:

OCT 2001-
PRESENT **SVL Analytical, Inc. – Kellogg, ID**

Organic Chemistry Department Analyst – Repairs and calibrates gas chromatographs and analytical instrumentation

AUG 1979-
MAY 2001 **Cargill, Inc. – Wayzata, MN**

Instrument Specialist VII – Installed, repaired, and maintained analytical instrumentation, including gas chromatographs and mass spectrometers; developed analytical methods for pesticide residues and olfactory and flavor compounds

EDUCATION:

JUL 1974-
JUL 1975 **South Hennepin Technical College – Eden Prairie, MN**

Environmental Technology Program

APR 2001 **Agilent Technologies**

HP 5973 GC-MSD Troubleshooting and Maintenance (H2294-A)

MAR 2001 **Transportation Skills Program, Inc.**

Hazardous Materials and Waste

AUG 2000 **Training Masters**

High Performance Liquid Chromatography

MAY 2000 **Minnesota Chromatography Forum**

Mass Spectral Interpretation

MAR 1998 **Enigma Analytical**

Applied Statistics and QC/QC Principles

SVL ANALYTICAL, INC.

STEPHANIE CLEARWATER

PROFESSIONAL EXPERIENCE:

JUNE 2001 - **SVL Analytical, Inc. - Kellogg, ID**
PRESENT

Organic Chemistry Department Chemist – Performs sample extractions for 608, 625, 8081A, 8141A, and 8270C analyses

NOV 2000 - **Christian Supply – Spokane, WA**
JUN 2001

Sales Associate – assisted customers, sold merchandise

JUN 2000 - **USDA Forest Service – Avery, ID**
SEP 2000

Forestry Technician – located timber sales; sprayed for noxious weeds, maintained vehicles

JUN 1999 - **Christian Supply – Spokane, WA**
OCT 1999

Sales Associate – assisted customers; maintained book stock; faxed customer orders

MAY 1997 - **EyeMasters – Spokane, WA**
SEP 1998

Lab Technician – fashioned prescription eyewear; maintained and calibrated equipment

EDUCATION:

SEP 1998 - **Eastern Washington University – Cheney, WA**
JUN 2000

B.S. Environmental Biology

KRISTINE B. HAAKENSEN

PROFESSIONAL EXPERIENCE

JUL 1998 - **SVL Analytical, Inc. - Kellogg, ID**
PRESENT

Organic Chemistry Department Chemist – GC/MS Operator. Responsible for analysis of environmental matrices for organic compounds according to standard EPA procedures using GC and GC/MS systems. Experienced in EPA methods 504.1, 524.2, 601/602, 608, 624, 625, 8015, 8021B, 8260B, 8270C, and the associated sample preparation requirements of the analyses. Duties include instrument set-up and maintenance, methods development, and report generation.

OCT 1997 - **Bayer Corporation - Spokane, WA**
JUL 1998

Quality Control Chemist – Executed analytical assays of injectable finished products and raw materials according to Standard Operating Procedures (SOP) and Good Manufacturing Practices (GMP) to ensure product specifications are met. Utilized various analytical instrumentation to perform analytical assays: HPLC, GC, and UV/VIS spectrophotometer.

SEP 1992 - **Analytical Sciences Laboratory, University of Idaho - Moscow, ID**
OCT 1997

Senior Organic Chemist – Supervised and managed the organic analytical laboratory division under all principles of Good Laboratory Practices (GLP) and EPA regulations for the routine determination of pesticides, herbicides, and various volatile and semi-volatile organic compounds in water, soil, environmental, and veterinary samples. Delegated and organized all analytical chemists' daily routine and non-routine analyses in the organic analytical group. Primary responsible person for the operation, maintenance, and troubleshooting of all primary analytical instrumentation in the organic laboratory including: GC's, GC/MS, HPLC, UV/VIS spectrophotometer, purge and trap with cryofocusing, high pressure gel permeation chromatograph. Primary responsible person for the performance of method validation and method detection limit studies for all EPA regulated and non-regulated methods under full GLP compliance. Responsible for performing standard recertification studies to guarantee the integrity of all pesticide, herbicide, and residue standards.

EDUCATION:

1987 - **Arizona State University - Tempe, AZ**
1991

BS Chemistry, Emphasis in Biochemistry

1992 **Northwest Quality Symposium**

Good Laboratory Practices Tutorial

1995 **University of Idaho**

Hazardous Waste Management

SVL ANALYTICAL, INC.

WENDY OZMINKOWSKI

PROFESSIONAL EXPERIENCE:

JAN 2002 - SVL Analytical, Inc. - Kellogg, ID
PRESENT

Supervisor Organic Chemistry Department – Responsible for analyses of soil and water samples for organic contaminants; reviews and approves data; operates GC and GC/MS instruments; interprets and reports data.

DEC 1998 - SVL Analytical, Inc. - Kellogg, ID
JAN 2002

Organic Chemistry Chemist – Performs analyses of soil and water samples for volatile organic compounds; operates GC and GC/MS instruments; interprets and reports data.

JUN 1998 - Quality Coatings – Post Falls, ID
AUG 1998

Laboratory technician – Developed Chemical Hygiene Plan, standardized chemical solutions; conducted titrimetric analyses, controlled pH, temperature, and chemical concentrations of industrial processes.

JAN 1997 - A.C. Data Systems – Post Falls, ID
AUG 1999

Mechanical assembly worker – Performed component soldering and mechanical assembly of panels and circuitry quality inspections, training, developed process documentation.

SEP 1993 - North Idaho College – Coeur d'Alene, ID
AUG 1995

Lab Assistant – Prepared reagents for laboratory demonstrations, standardized chemical solutions, conducted chemical and equipment inventory, supervised students, set-up laboratory demonstrations

EDUCATION:

1997 - North Idaho College – Coeur d'Alene, ID
1998

A.S. in Premedical Studies 1998

1994 - University of Idaho – Moscow, ID
1996

B.S. in Chemistry 1996

1991 - North Idaho College – Coeur d'Alene, ID
1995

A.S. in Chemistry 1995

SVL ANALYTICAL, INC.

JUDY ASHCRAFT

PROFESSIONAL EXPERIENCE:

NOV 1994 - **SVL Analytical, Inc. - Kellogg, ID**
PRESENT

Organic Chemistry Department Analyst – Analyzes samples for Pesticides, PCBs, Petroleum Hydrocarbons, TOC, TOX, and Ethylene Glycol; performs solid phase extractions, liquid/liquid extractions of soil, water, and waste.

1968 - **Minnesota Valley Testing Laboratories, Inc. - New Ulm, MN**
1994

GLP Laboratory Technician – Performed organic extractions including liquid-liquid partition, solid phase extraction, gel permeation, and open column chromatography. Matrices included soil, water, plants, and food products. Performed routine record keeping and data entry as well as training lab personnel.

Previous positions with this employer included:

Soils Lab Assistant to the Nutrients and Minerals supervisor and experience in the inorganic lab covering areas such as domestic & waste water, plant nutrients & minerals, feed nutrients, and used oil analysis.

Training included: techniques in "Good Laboratory Practices Standards" (GLP) as delineated in 40 CFR, Part 160 (US EPA), Laboratory Safety, Quality Assurance, and familiarity with the following instruments: color spectrophotometer, atomic absorption spectrophotometer, ultrasonic processor, electric kiln, flash point detector, analytical balances, pH meters, vacuum box, centrifuge, heating & distilling units, rotary evaporator, steam water bath, and gas chromatography (limited).

EDUCATION:

1968 **Mankato Commercial College - Mankato, MN**
General Business Course work

SVL ANALYTICAL, INC.

KEVIN HATHAWAY

PROFESSIONAL EXPERIENCE:

MAR 1987 - **SVL Analytical, Inc. – Kellogg, ID**
PRESENT

Inorganic Instrument Operator – Operates GFAA instruments; also trained in Ion Chromatography and Mercury analysis by Cold Vapor Atomic Absorption.

EDUCATION:

1993 - **North Idaho College – Coeur d' Alene, ID**
1994

Basic Concepts in Chemistry

SVL ANALYTICAL, INC.

ANNE L. SPRADLIN

PROFESSIONAL EXPERIENCE:

MAR 1997 - **SVL Analytical, Inc. - Kellogg, ID**
PRESENT

ICP Spectroscopist – Operates ICP utilizing standard methods of analysis such as SW846 as well as USEPA CLP procedures.

1993 - **Quanterra Environmental Services - Richland, WA**
1997

Chemist III – Operated radiation detection instrumentation such as Alpha Spectrometers, Gamma detectors, Gas Proportional Counters and Liquid Scintillation analyzers. Utilized computers in acquisition and reporting of data and performed data review.

1985 - **National Environmental Testing, Inc. - Dallas, TX**
1993

Supervisor Metals Department – Supervised analysts, delegated work distribution, implemented company QA/QC program, evaluated accuracy of reported data, trained new employees. Analyzed for metals utilizing Thermo Jarrell-Ash ICP, Perkin Elmer 5000 ICP, Perkin Elmer 5000 AA, Hitachi Z-9000 and Perkin Elmer 3030 graphite furnaces. In addition, performed Cold-vapor Mercury Analyses, sample prep, routine maintenance and troubleshooting of instrumentation. Also performed Wet Chemistry analyses for two years; parameters included BOD, COD, cyanide, TPH and many other common wet chem analyses. Interpreted and reported data.

1984 - **Environment Protection Laboratories - St. Cloud, MN**
1985

Performed wet chemistry and microbiological analyses.

EDUCATION:

1979 - **Concordia College, Moorhead, MN**
1981

General Studies

1981 - **Saint Cloud State University - Saint Cloud, MN**
1983

B.A. Biology (with emphasis in Microbiology)

SVL ANALYTICAL, INC.

ANN MARIE COSTELLO

PROFESSIONAL EXPERIENCE:

NOV 1991 - **SVL Analytical, Inc. - Kellogg, ID**
PRESENT

Inorganic Instrument Operator — Analyzes samples by Ion Chromatography; operates GFAA using USEPA CLP procedures. Also trained in the operation of the ICP instrument for CLP samples of both water and soil matrices.

1979 - **Energy Laboratories - Billings, MT**
1980

Lab Technician — Plant and soil analysis using classical chemistry and AA techniques.

1975 - **Chen Northern - Billings, MT**
1977

Lab Technician — Plant and soil analysis using classical chemistry and AA techniques.

1972 - **Montana State University Plant Research Center - Bozeman, MT**
1975

Lab Technician — Plant and soil analysis using classical chemistry and AA techniques.

EDUCATION:

1967 - **Montana State University, Bozeman, MT**
1971

B.S. Microbiology

SVL ANALYTICAL, INC.

DANNY J. SEVY

PROFESSIONAL EXPERIENCE:

1996 -
PRESENT

SVL Analytical, Inc. - Kellogg, ID

Inorganic Instrument Operator -- Performs metals analysis by ICP and GFAA using SW846 and CLP methodology.

1994 -
1996

SVL Analytical, Inc. - Kellogg, ID

Classic Chemistry Analyst -- Performed classical Wet Chemistry analyses on water and soil samples using CLP procedures. This included the preparation and analysis of Cyanide and Nitrate/Nitrate (as N) tests for soil and water samples.

1988 -
1994

SVL Analytical, Inc. - Kellogg, ID

Instrument Operator -- Analyzed samples using Cold Vapor Atomic Absorption and Ion Chromatography

APR 1987 -
1988

SVL Analytical, Inc. - Kellogg, ID

Laboratory Technician -- Performed inorganic sample preparation and operated CVAA and GFAA instruments.

EDUCATION:

1989 -
1990

North Idaho College - Coeur d' Alene, ID

Chemistry and Mathematics courses

SVL ANALYTICAL, INC.

KAY JOHNSON

PROFESSIONAL EXPERIENCE:

**JUN 1992 -
PRESENT SVL Analytical, Inc. - Kellogg, ID**

Fire Assayer – Performs fire assays of ore and mineral samples; analyzes ore and mineral samples for metal content by atomic absorption

1967 - 1969 Idaho Bureau of Mines and Geology – Moscow, ID

Lab Technician – performed sample preparation and chemical analysis

EDUCATION:

**1964 -
1965 Whitworth College – Spokane, WA**

Evening courses

**1959 -
1960 Spokane Community College – Spokane, WA**

Dental Technician program

SVL ANALYTICAL, INC.

ARLENE FATTU

PROFESSIONAL EXPERIENCE:

MAR 1989 - SVL Analytical, Inc. - Kellogg, ID
PRESENT

Inorganic Instrument Technician — Performs analyses for Mercury with CETAC instrument;
inorganic sample preparation.

EDUCATION:

1971 - University of Idaho - Moscow, ID
1975

B. S. Home Economics (chemistry courses)

SVL ANALYTICAL, INC.

MELBA BENCICH

PROFESSIONAL EXPERIENCE:

FEB 1988 - SVL Analytical, Inc. - Kellogg, ID
PRESENT

Data Processing and Reporting Coordinator — Supervises data reporting, utilizing USEPA CLP procedures for deliverables and compliance screening.

1984 - Shoshone Insurance - Kellogg, ID
1988

Duties included accounting, customer service relations and updating manuals.

1982 - Time To Travel - Wallace, ID
1984

Travel Consultant

1974 - The Bunker Hill Company - Kellogg, ID
1981

Data Control Analyst

EDUCATION:

1967 - North Idaho College - Coeur d' Alene, ID
1968

General Studies

1980 International Correspondence School

Mathematics

SVL ANALYTICAL, INC.

RUSSELL L. ALLRED

PROFESSIONAL EXPERIENCE:

SEP 1987 - **SVL Analytical, Inc. - Kellogg, ID**
PRESENT

Programmer Analyst – Provides computer and systems analysis; maintenance and repair. Novell certified administrator, trained Novell certified internet professional. Service and maintain in-house phone switching equipment. Perform accounting audits and prepare company financial statements.

1981 -
SEP 1987 **Cook Lumber - Murray, UT**

Computer Analyst – Maintained a multi-user system that affected all aspects of the business and trained employee users.

EDUCATION:

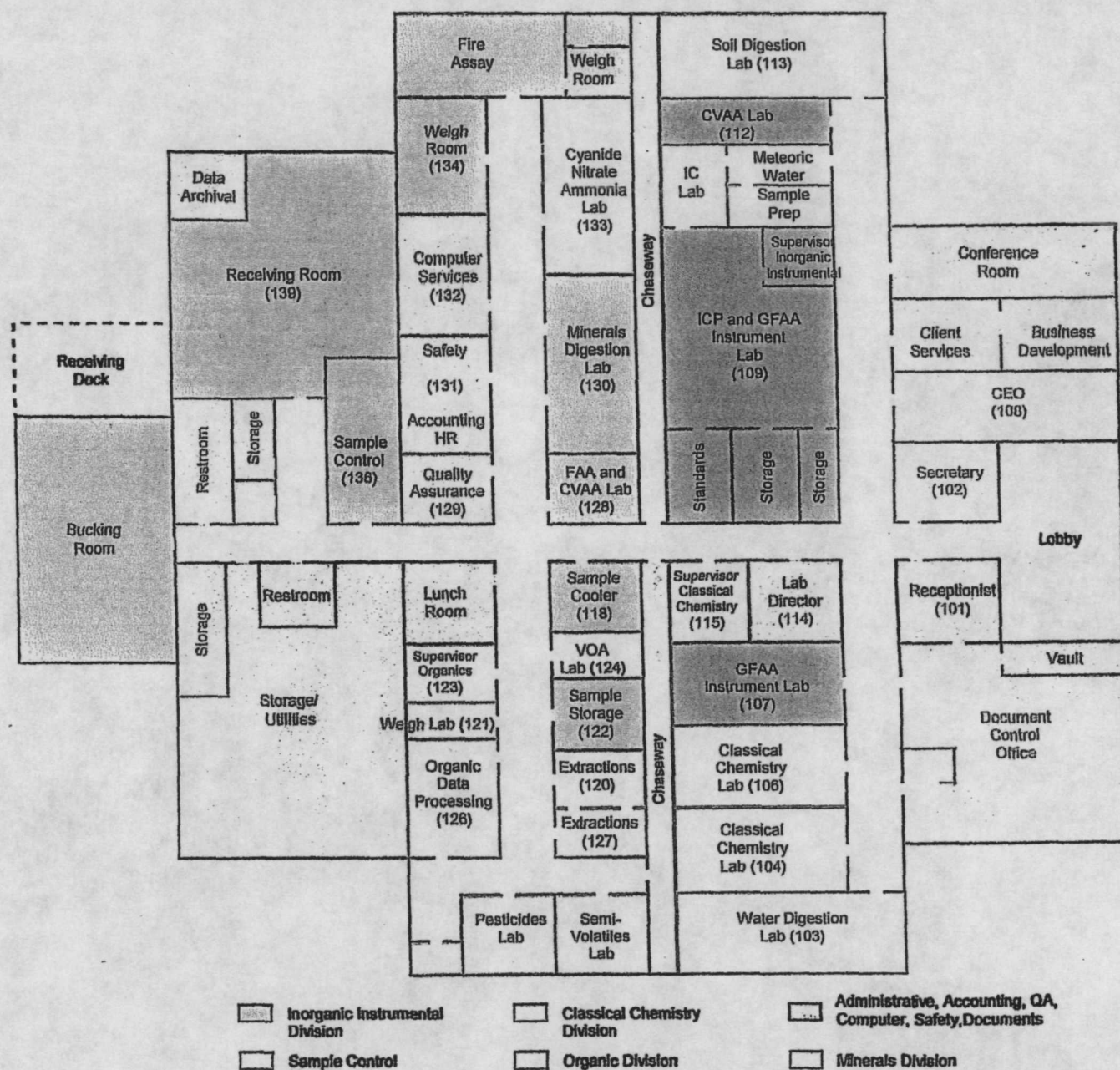
1987 **Salt Lake Community College - Salt Lake City, UT**

Computer Science

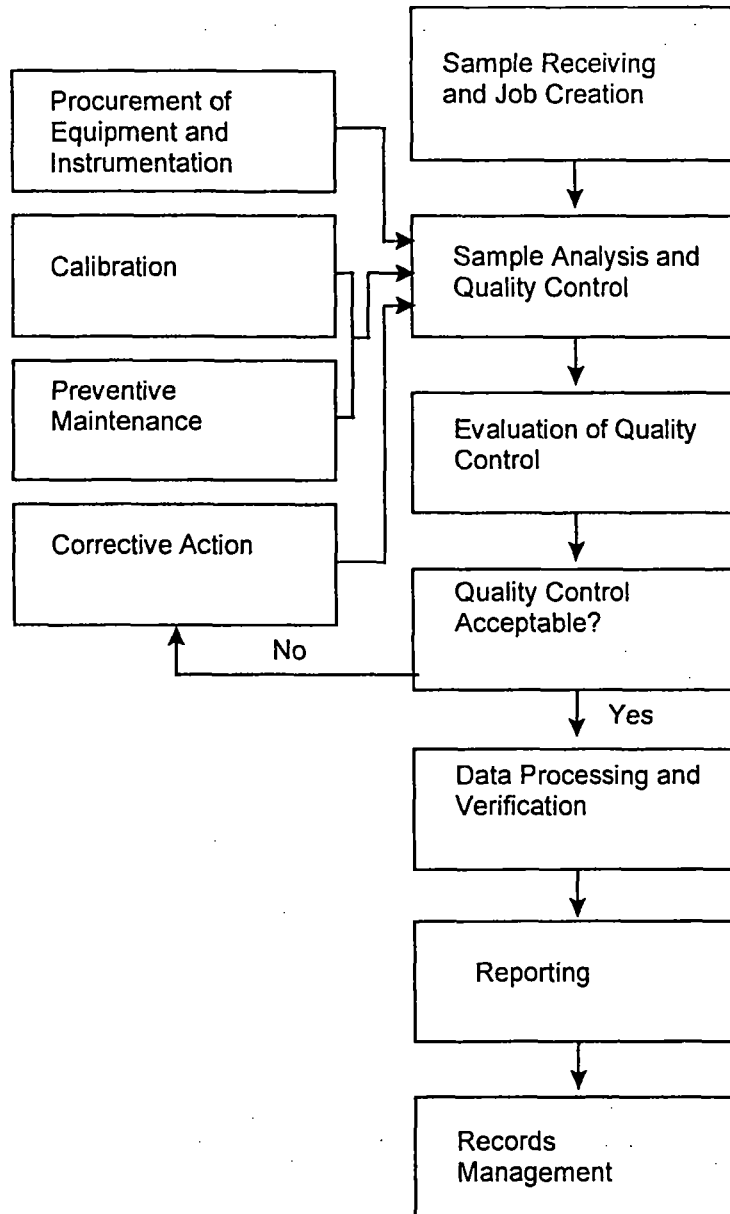
1978 -
1986 **University of Utah, Salt Lake City, UT**

Computer Science

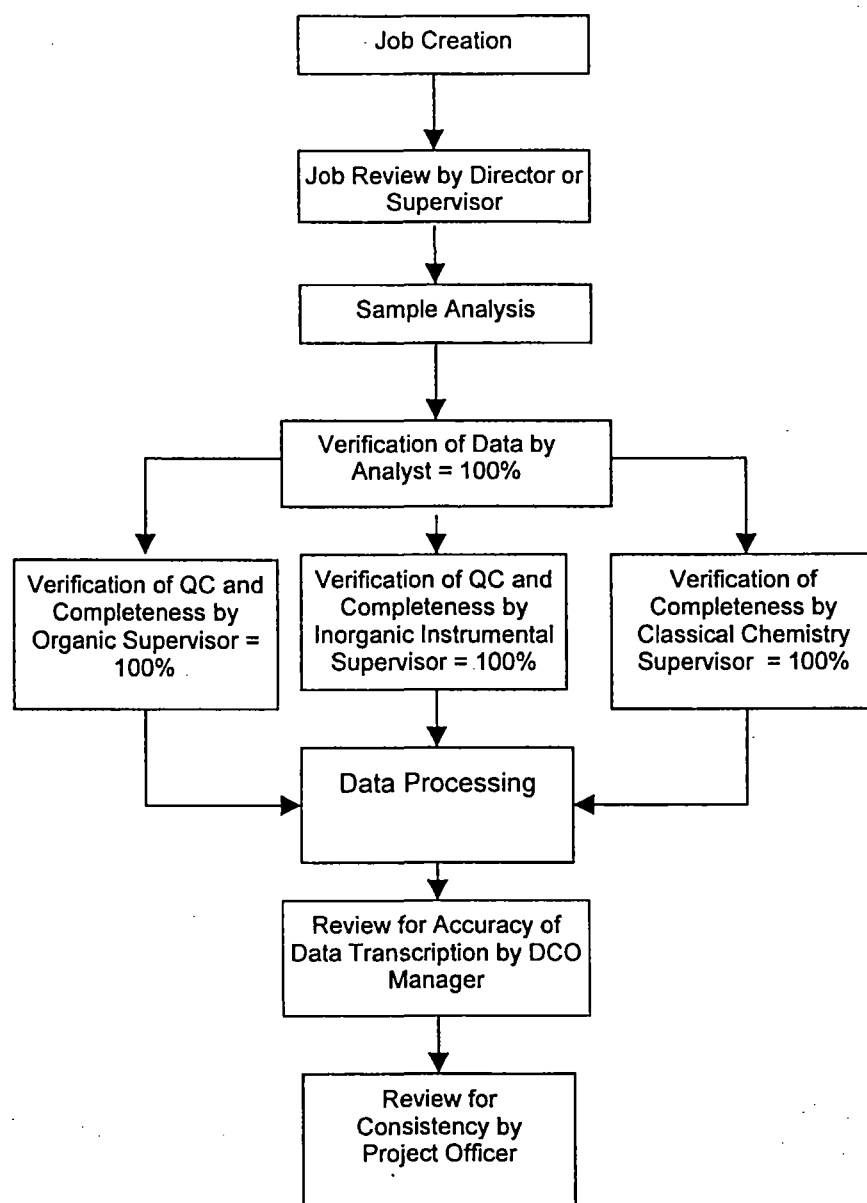
1.4 SVL Analytical, Inc. Laboratory Layout



1.5 Laboratory Analysis Flow Chart



1.6 Data Review Flow Diagram



2 INSTRUMENTATION AND ANALYSIS

SVL is equipped with state-of-the-art instrumentation, for all of your analytical needs

2.1 INSTRUMENTS FOR TRACE METAL ANALYSIS

INSTRUMENT	MANUFACTURER	MODEL
Inductively Coupled Plasma Spectrometer	Perkin-Elmer	Optima
Inductively Coupled Plasma Spectrometer	Perkin-Elmer	Optima
Inductively Coupled Plasma/ Mass Spectrometer	Perkin-Elmer	ELAN 5000
Atomic Absorption Spectrometer with Graphite Furnace Atomizer	Varian	SpectrAA 300Z
Atomic Absorption Spectrometer with Graphite Furnace Atomizer	Varian	SpectrAA 300Z
Atomic Absorption Spectrometer with Graphite Furnace Atomizer	Varian	SpectrAA 400Z
Atomic Absorption Spectrometer with Graphite Furnace Atomizer	Varian	SpectrAA 40Z
Atomic Absorption Spectrometer with Graphite Furnace Atomizer	Varian	SpectrAA 20
Atomic Absorption Spectrometer with Vapor Generation Assembly	Varian	SpectrAA 20
Atomic Absorption Spectrometer with Vapor Generation Assembly	Varian	SpectrAA 20
Mercury Analyzer	CETAC	M-6000A

2.2 Instruments for Organic Analysis

INSTRUMENT	MANUFACTURER	MODEL
Gas Chromatograph with Dual ECD Detectors and Autosampler	Hewlett-Packard Hewlett-Packard	5890 HP 7673
Gas Chromatograph with FID and NPD Detectors and Autosampler	Hewlett-Packard Hewlett-Packard	5890A HP 7673A
Gas Chromatograph with FID Detector and Autosampler	Hewlett-Packard Hewlett-Packard	5890A HP 7673
Gas Chromatograph with PID and Hall Detectors and Liquid Sample Concentrator/Autosampler	Hewlett-Packard Tekmar	5890A LSC 2000/ ALS 2016
Gas Chromatograph with MS Detector and Purge and Trap Concentrator	Hewlett-Packard Tekmar	5890E with 5972 MS Purge and Trap
Gas Chromatograph with PID and ELCD Detector with Liquid Sample Concentrator/Autosampler	Hewlett-Packard OI	5890 4560/ MPM-16
Gas Chromatograph with MS Detector and Purge and Trap Concentrator	Hewlett-Packard Tekmar	5890 with 5971 MSD LSC 2000/ ALS 2016
Gas Chromatograph with MS Detector and Autosampler	Hewlett-Packard Hewlett-Packard	5890 7673
Gas Chromatograph with MS Detector	Hewlett-Packard	5890A with 5870 MSD
Gas Chromatograph with NPD and FPD Detectors And Autosampler	Agilent Agilent	6890A 7683
HPLC	Agilent	1050
Accelerated Solvent Extractor	Dionex	ASE200
Zero Head Space Extractor	Millipore	
Carbon Analyzer (TOC)	Shimadzu	TOC-5000A
Organic Halogen Analyzer (TOX)	MCI (Mitsubishi)	TOX-10

2.3 Instruments for Inorganic Analysis

INSTRUMENT	MANUFACTURER	MODEL
Ion Chromatograph	Dionex	2000i
Ion Chromatograph	Dionex	DX-100
Ion Chromatograph	Dionex	4000i
Automated Flow Analyzer with Autosampler	Alpkem	FS300
Automated Flow Analyzer with Autosampler	Alpkem	FS300
MIDI Distillation Unit	BSL	
MIDI Distillation Unit	BSL	
MIDI Distillation Unit	BSL	
Auto Titrator with Autosampler	Brinkmann	Titrimo 716
Auto Titrator with Autosampler	Brinkmann	Titrimo 716
UV/Visible Spectrophotometer	Bausch & Lomb	501
Turbidimeter	Hach	2100
COD Reactor	Hach	COD
COD Reactor	Hach	COD
pH Meter	Coming	150
pH/Ion Meter	Coming	450
Dissecting Microscope	Nikon	104
Polarizing Microscope	Nikon	106
Conductance Meter	YSI	32
Dissolved Oxygen Meter	YSI	50B
Elemental Analyzer	LECO	SC444

2.4 Routine Analyses Performed

ANALYTE	METHOD	TECHNIQUE
Aluminum	EPA 200.7, 6010B	ICP
Antimony	EPA 200.7, 6010B	ICP
Antimony	EPA 204.2, 7040	GFAA
Antimony	EPA 200.9	GFAA
Arsenic	EPA 200.7, 6010B	ICP
Arsenic	EPA 206.2, 7060A	GFAA
Arsenic	EPA 200.9	GFAA
Barium	EPA 200.7, 6010B	ICP
Beryllium	EPA 200.7, 6010B	ICP
Boron	EPA 200.7, 6010B	ICP
Cadmium	EPA 200.7, 6010B	ICP
Cadmium	EPA 213.2, 7131A	GFAA
Cadmium	EPA 200.9	GFAA
Calcium	EPA 200.7, 6010B	ICP
Chromium	EPA 200.7, 6010B	ICP
Chromium	EPA 218.2, 7191	GFAA
Chromium	EPA 200.9	GFAA
Cobalt	EPA 200.7, 6010B	ICP
Copper	EPA 200.7, 6010B	ICP
Gold	EPA 231.2	GFAA
Iron	EPA 200.7, 6010B	ICP
Lead	EPA 200.7, 6010B	ICP
Lead	EPA 239.2, 7420	GFAA
Lead	EPA 200.9	GFAA
Magnesium	EPA 200.7, 6010B	ICP
Manganese	EPA 200.7, 6010B	ICP

SVL ANALYTICAL, INC.

ANALYTE	METHOD	TECHNIQUE
Mercury	EPA 245.1, 7470A, 7471A	CVAA
Nickel	EPA 200.7, 6010B	ICP
Potassium	EPA 200.7, 6010B	ICP
Selenium	EPA 200.7, 6010B	ICP
Selenium	EPA 270.2, 7740	GFAA
Silica	EPA 200.7	ICP
Silver	EPA 200.7, 6010B	ICP
Silver	EPA 272.2, 7761	GFAA
Sodium	EPA 200.7, 6010B	ICP
Strontium	EPA 200.7, 6010B	ICP
Thallium	EPA 200.7, 6010B	ICP
Thallium	EPA 279.2, 7840	GFAA
Tin	EPA 200.7, 6010B	ICP
Titanium	EPA 200.7, 6010B	ICP
Vanadium	EPA 200.7, 6010B	ICP
Zinc	EPA 200.7, 6010B	ICP
Acidity	SM 2310B	Titration
Alkalinity	SM 2320B	Titration
Ammonia	EPA 350.3	Ion Specific Electrode
Biochemical Oxygen Demand	SM 5210B	D.O. Meter
Bromide	EPA 300.0	Ion Chromatography
Chemical Oxygen Demand	EPA 410.4	Colorimetry
Chloride	EPA 300.0	Ion Chromatography
Corrosivity	SM 2330 (B)	Langlier Index
Cyanide, Total	EPA 335.4	Automated Colorimetry
Cyanide, Total	EPA 335.2, 9012A	Automated Colorimetry
Cyanide, WAD	SM 4500 CN (I)	Automated Colorimetry

SVL ANALYTICAL, INC.

ANALYTE	METHOD	TECHNIQUE
Fluoride	EPA 300.0	Ion Chromatography
Fluoride	EPA 340.2	Ion Specific Electrode
Hardness	SM 2340B	ICP Sum
Hexane Extractable Materials	EPA 1664	Gravimetric
Nitrate	EPA 300.0	Ion Chromatography
Nitrate	EPA 353.2	Automated Colorimetry
Nitrate + Nitrite	EPA 353.2	Automated Colorimetry
Nitrite	EPA 300.0	Ion Chromatography
Nitrite	EPA 353.2	Automated Colorimetry
Oil & Grease	EPA 1664	Gravimetric
ortho-Phosphate	EPA 365.1	Colorimetry
pH	EPA 150.1	Electrometric
Phenolics, Total	EPA 420.1	Colorimetric
Phosphate, Total	EPA 365.2	Persulfate Digestion
Residue, Filterable	EPA 160.1	Gravimetric
Residue, Filterable	SM 2540C	Gravimetric
Residue, Nonfilterable	EPA 160.2	Gravimetric
Specific Conductance	EPA 120.1	Wheatstone Bridge
Sulfate	EPA 300.0	Ion Chromatography
Sulfide	EPA 376.1	Titrimetric
TCLP	EPA 1311	Extraction
Total Dissolved Solids	EPA 160.1	Gravimetric
Total Dissolved Solids	SM 2540C	Gravimetric
Total Kjeldahl Nitrogen	EPA 351.4	Ion Selective Electrode
Total Organic Carbon	EPA 415.1	Combustion
Total Organic Halides	EPA 450.1	Adsorption-Pyrolysis, Titrimetric
Total Suspended Solids	EPA 160.2	Gravimetric

SVL ANALYTICAL, INC.

ANALYTE	METHOD	TECHNIQUE
Aromatic Volatile Compounds	EPA 602	GC/PID
Organochlorine Pesticides and PCBs	EPA 608	GC/ECD
Organochlorine Pesticides	EPA 8081A	GC/ECD
PCBs	EPA 8082	GC/ECD
Semivolatile Organic Compounds	EPA 625	GC/MSD
Semivolatile Organic Compounds	EPA 8270C	GC/MSD
Volatile Organic Compounds	EPA 524.2	GC/MSD
Volatile Organic Compounds	EPA 624	GC/MSD
Volatile Organic Compounds	EPA 8260B	GC/MSD
Halogenated Organic Compounds	EPA 601	GC/ELCD
Volatile Organic Compounds	EPA 8021B	GC/PID/ELCD
Total Petroleum Hydrocarbons-- Gasoline	EPA 8015	GC/FID
Total Petroleum Hydrocarbons-- Diesel	EPA 8015	GC/FID

3. ANALYTICAL PROCEDURES

SVL Analytical, Inc. uses established procedures whenever possible

Analysis of samples is performed according to SVL Standard Operating Procedures (SOPs). The SOPs are created using established procedures such as those referenced in the following section.

3.1 References

Methods for Chemical Analysis of Water and Wastes, revised March 1983, EPA-600/4-79-020.

Methods for the Determination of Organic Compounds in Drinking Water Supplement I, EPA/600/4-88/039, July 1990.

Methods for the Determination of Organic Compounds in Drinking Water Supplement III, EPA/600R-95-131, August 1995.

Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW 846), Third Edition, Update III, December 1996.

Standard Methods for the Examination of Water and Wastewater, 16th Edition, 1985

Standard Methods for the Examination of Water and Wastewater, 19th Edition, 1995.

ASTM Book of Standards, part 31

USEPA CLP Inorganic Statement of Work ILM04.0.

4. ETHICS AND DATA INTEGRITY AGREEMENT

We are committed to providing our clients with accurate and defensible data

SVL Analytical, Inc. is committed to providing its clients with accurate and defensible data and meeting all client requirements for data quality and integrity. To achieve this commitment, and as a condition for employment, all employees agree to follow SVL's policy regarding ethics and data integrity which is characterized in the items listed below.

All work performed shall be in accordance with appropriate work order agreements, specified methods, SOP's, and contracts.

All reported data, including analysis dates and times, shall represent actual values obtained and are not modified, or manipulated in any manner which is not described in the referenced method.

Analysts performing technical methods in the name of SVL shall not represent work which was performed by other individuals as their own.

Client results shall be kept strictly confidential and released to a third party only with written permission by the client.

Violation of these standards is grounds for disciplinary action as stated in section II of SVL's Employee Handbook, including termination.

5. QUALITY ASSURANCE AND QUALITY CONTROL

The procedures outlined in this manual are the basis of the SVL Analytical, Inc. quality assurance plan (QAP)

SVL recognizes that an effective and vigorously pursued quality program is key to providing analytical data which is legally defensible, technically accurate, and scientifically meaningful.

At SVL, quality control begins once the objectives of a survey are defined and proceeds through data reporting. Control procedures are defined for every step of the program and detailed in current standard operating procedures (SOPs).

SVL realizes that without these controls in all phases of the laboratory and analytical process, data becomes suspect and hence, of less value to our client. Therefore, SVL is dedicated to providing data of the highest quality, usability, and defensibility for every project we undertake.

5.1 Quality Assurance Policy and Objectives

The primary emphasis of the QAP is twofold. The first of these is to define quality control procedures for all activities that take place in the laboratory. These include the following: receipt, handling, and storage of samples; preparation and maintenance of standards, reagents, gases, and water; calibration and maintenance of analytical equipment; performance, and evaluation of analytical methodologies (in conformance with the parameters defined by the appropriate regulatory agency; and the compilation and generation of reportable data packages.

The other emphasis of the QAP is to characterize the documentation practices utilized in all facets of the laboratory process. The objective is to provide a uniform basis for instrument maintenance, document control, analytical methodologies, data generation, quality assurance, and quality control.

The procedures outlined in this manual are the basis of the SVL Analytical Quality Assurance Plan (QAP).

5.2 Quality Assurance Management

SVL employs one full time Quality Assurance Coordinator who reports directly to the President and CEO, providing independence from the routine operation of the individual departments of the laboratory. The Quality Assurance Coordinator is responsible for the management and implementation of the quality assurance program. He is responsible for monitoring the overall adequacy of the program as well as determining departmental conformance to the QA program. The QA Coordinator is responsible for recommending corrective actions as necessary.

In addition, the Quality Assurance Coordinator develops quality control programs; monitors quality assurance activities to determine conformance with policies and procedures; evaluates and maintains records of data quality and other pertinent performance information; and coordinates investigations of quality problems. Supervisors are responsible for seeing that their staff receive adequate training in and follow the specific procedures outlined in this QAP.

5.3 Sample Collection and Handling

This section describes the quality control procedures to be followed in the collection and handling of samples for SVL. These procedures are recommended to all clients submitting samples for chemical analysis. Glassware preparation is included in this section because it is an integral part of any sampling program. It is assumed that the objectives of a study for which samples are to be collected have been stated and the number of samples, types of samples, frequency of collection, and duration of the sampling program have been established. Finally, it is assumed that all personnel involved in sample acquisition are aware of the above factors.

If utilized, the procedures characterized here result in more confidence in the data produced and the samples are processed more efficiently. The result of standardizing sample collection and handling procedures is less confusion for the project manager, field personnel, and laboratory staff.

The most important aspects of quality control for sample collection and handling are sample integrity and representivity.

5.3.1 Sample Integrity

Sample preservation is critical for sample integrity given the potential for transportation delays and hold ups. Chemical reactions may occur and some chemical species begin to change upon sample collection. Unfortunately, for most samples immediate analysis is neither economically feasible or logistically possible. Although no miracle chemical preservative valid for every parameter exists, SVL strongly recommends the preservation methods, container type, sample size and estimated maximum holding times for collection of water and wastewater samples summarized in Table 5-1.

Solid samples are best preserved by refrigeration at $4^{\circ}\text{C} \pm 2^{\circ}\text{C}$. Analysis begins as soon as possible after lab receipt of samples. SVL does its utmost to ensure that all holding times are met for water samples as listed in Table 5-1. A complete record is maintained on each sample to provide a history of handling from the time of collection through analysis and sample disposal.

Table 5-1 Recommendation for Sampling and Preservation of Aqueous Samples

Analysis	Vol. Req. (mL)	Container	Preservative	Holding Time
PHYSICAL PROPERTIES				
Color	50	P,G ¹	Cool 4 °C	48 Hours
Conductance	100	P,G	Cool 4 °C	28 Days
Hardness	100	P,G	HNO ₃ to pH<2	6 Months
Odor	200	G only	Cool 4 °C	24 Hours
pH	25	P,G	None Req.	Analyze Immediately
Temperature	1000	P,G	None Req.	Analyze Immediately
Turbidity	100	P,G	Cool 4 °C	48 Hours

Table 5-1 Recommendation for Sampling and Preservation of Aqueous Samples

Analysis	Vol. Req. (mL)	Container	Preservative	Holding Time
RESIDUES				
Filterable (TDS)	100	P,G	Cool 4 °C	7 Days
Non-Filterable (TSS)	100	P,G	Cool 4 °C	7 Days
Total	100	P,G	Cool 4 °C	7 Days
Volatile	100	P,G	Cool 4 °C	7 Days
Settleable Matter	1000	P,G	Cool 4 °C	48 Hours
METALS				
Dissolved	200	P,G	Filter on site HNO ₃ to pH<2	6 Months
Suspended	200	P,G	Filter on site	6 Months
Total	100	P,G	HNO ₃ to pH<2	6 Months
Chromium (VI)	200	P,G	Cool 4 °C	24 Hours
Mercury, Dissolved	100	P,G	Filter HNO ₃ to pH<2	28 Days
Mercury, Total	100	P,G	HNO ₃ to pH<2	28 Days
INORGANIC				
Acidity	100	P,G	Cool 4 °C	14 Days
Alkalinity	100	P,G	Cool 4 °C	14 Days
Bromide	100	P,G	None Req.	28 Days
Chloride	50	P,G	None Req.	28 Days
Cyanide	500	P,G	Cool 4 °C NaOH to pH>12	14 Days
Fluoride	300	P	None Req.	28 Days
Iodide	100	P,G	Cool 4 °C	24 Hours
Ammonia	400	P,G	Cool 4 °C H ₂ SO ₄ to pH<2	28 Days
Total Kjeldahl Nitrogen	500	P,G	Cool 4 °C H ₂ SO ₄ to pH<2	28 Days
Nitrate plus Nitrite	100	P,G	Cool 4 °C H ₂ SO ₄ to pH<2	28 Days
Nitrate	100	P,G	Cool 4 °C	48 Hours
Nitrite	50	P,G	Cool 4 °C	48 Hours
Ortho-Phosphate Dissolved	50	P,G	Filter on site Cool 4 °C	48 Hours
Total Phosphate	50	P,G	Cool 4 °C H ₂ SO ₄ to pH<2	28 Days
Total Dissolved Phosphate	50	P,G	Filter on site Cool 4 °C H ₂ SO ₄ to pH<2	24 Hours
Silica	50	P only	Cool 4 °C	28 Days
Sulfate	50	P,G	Cool 4 °C	28 Days
Sulfide	500	P,G	Cool 4 °C add 2 mL zinc acetate plus NaOH to pH>9	7 Days
Sulfite	50	P,G	None Req.	Analyze Immediately

Table 5-1 Recommendation for Sampling and Preservation of Aqueous Samples

Analysis	Vol. Req. (mL)	Container	Preservative	Holding Time
ORGANICS Group I				
COD	50	P,G	Cool 4 °C H ₂ SO ₄ to pH<2	28 Days
Oil & Grease	1000	G only	Cool 4 °C H ₂ SO ₄ to pH<2	28 Days
Organic Carbon	25	P,G	Cool 4 °C H ₂ SO ₄ or HCl to pH<2	
Phenolics	500	G only	Cool 4 °C H ₂ SO ₄ to pH<2	28 Days
MBAS	250	P,G	Cool 4 °C	48 Hours
ORGANICS Group II				
Volatile Organics 8010/8020/8260	2x40mL/ 1x4oz	G,T	Cool 4 °C HCl pH<2	14 days
Semi-volatile Organics 8270/8080	1 L / 1x8 oz	G,T	Cool 4 °C No Preserv.	7/14 days
TPH - Total Petro. Hydrocarbons				
THP-Gas	2x40 mL/ 1x4 oz	G,T	Cool 4 °C	14 days
TPH-Diesel	1 L / 1x8 oz	G,T	Cool 4 °C	14 days
TPH-IR	1 L / 1X8 oz	G,T	Cool 4 °C	14 days

NOTES: - ¹Plastic (P), Glass (G), Teflon-lined cap (T). For metals, polyethylene with a polypropylene cap (no liner) is preferred.

Preservation: - Sample preservation should be performed immediately upon sample collection. For composite samples each aliquot should be preserved at the time of collection. When use of an automated sampler makes it impossible to preserve each aliquot, the samples may be preserved by maintaining at 4 °C until compositing and sample splitting is completed.

Holding Time: - Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still be considered valid.

5.3.2 Sample Representivity

Sampling precision is determined in the initial phase of a long-term sampling program. It is checked thereafter with a single duplicate sample per batch of samples, and usually with every sample delivery group.

Field blanks allow identification of systematic and random sample contamination which may result from the sampling equipment, storage containers, sampling agents, or chemicals added to preserve samples. This contamination can be checked by filling a randomly selected sample container with distilled water and the appropriate chemical preservative. Field blanks are analyzed as samples and therefore, are treated exactly as samples: all aliquots, preservation, filtration, storage and handling procedures are performed as if the field blanks are samples. To achieve accurate and meaningful data, field blank "sample" containers are filled at the sampling site, not after returning to the field laboratory.

Two general classifications of contamination exist; random and systematic. Random contamination causes imprecision in analytical results as noted by significant differences between results of duplicate analyses. Systematic contamination generally results in consistent shifts in baseline concentrations; this is demonstrated through the use of field blanks. Systematic contamination is much easier to eliminate and to address when interpreting the data. The best way to restrict contamination of the systematic type is to treat every sample, blank, or replicate identically. The vast majority of contamination of this type occurs at trace levels.

Sources of possible sample contamination exist including the following: contaminated sample containers; unclean glassware and filters; impure solvents and reagents; use of cleaning products inappropriate for the proposed analysis; inadequate rinsing of glassware during the cleaning process; and inadequate pre-sample rinsing (the sample bottle should be rinsed two to three times with small volumes of the sample before the bottle is filled to overflowing). Pre-sample rinsing is not possible for certain parameters when pre-preserved bottles are used. Hair, tobacco smoke, and dust are also appreciable sources of contamination, so sampling should be conducted in as careful a manner as possible.

Before filtering samples, the filter paper should be rinsed with deionized or distilled water and with a small portion of sample. The filtration apparatus should also be rinsed with deionized or distilled water between samples. Handle filter paper only on the edge, using appropriate forceps (plastic for trace metals analysis, metal for organic analysis).

Use the proper sample container for the parameter specified. Trace metals samples must not come into contact with any metallic surface; samples for organic analysis must not come into contact with any plastic surface.

5.3.3 Cleaning Procedures for Sample Containers

Immerse glassware in a solution of synthetic detergent. Scrub it with a brush, rinse it several times with tap water, and then with deionized water. Glassware for samples to be analyzed for trace metals may also require treatment with hot nitric and hydrochloric acids (see SOP 4013). Glassware for samples to be analyzed for organic analysis may also require solvent rinses and baking (see SOP 3001).

5.3.4 Sample Receipt and Handling

Sample receipt and handling procedures at SVL are based upon the CLP guidelines to ensure efficient generation of high quality analytical results. SVL SOPs cover all sample handling procedures and are easily accessible to the sample custodian and staff.

5.3.4.1 Requesting Analysis

A request for analysis shall be completed by the field personnel. It is imperative that the Order for Analytical Services (SVL's is in the form of a chain-of-custody, see example located in Appendix A) or an equivalent be provided which defines analytical requirements and enables the lab to meet sample holding times.

5.3.4.2 Chain-of-Custody

Laboratory custody conforms to procedures established for the USEPA Contract Laboratory Program (CLP). Improper sample and data handling and inadequate chain-of-custody procedures affect the credibility and acceptability of analytical results, regardless of their accuracy and precision. Therefore, it is essential that all samples be properly collected, handled, and analyzed. It is imperative that a chain-of-custody be maintained to document the proper processing of samples, from the time of collection to the time of analysis. Use of a Chain-of-Custody or an equivalent form is required to document this process.

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All pertinent information is obtained and recorded on the chain-of-custody (as filled out by the field/sample collectors). At a minimum, the following information is recorded: sampling conditions, date and time of sample collection, type of sampling device, type of sample container, number and size of samples and other information required by the laboratory for proper sample handling and analysis. To prevent tampering, sample seals may be used.

5.3.4.3 Sample Handling

SVL is in communication with a client designated individual (designee) as necessary throughout the process of sample scheduling, shipment, analysis and data reporting to ensure that samples are properly processed. This communication includes immediate notification of the designee of anomalies and irregularities with samples or sample paperwork which is received by SVL and discrepancies or problems encountered in sample analysis that will affect the data produced.

A temperature reading is taken by the SVL sample custodian for all sample shipping containers (coolers) upon initial receipt and opening. Each sample is checked for visible damage and the presence of an intact custody seal. Each sample is assigned a unique sample identification number batched with other samples which have been received from the same client and assigned a Job number (for details, please see the next paragraph). After initial sample check-in and generation of sample labels, additional sample/client information is logged into SVL's laboratory information management system (LIMS). Samples are stored in a secured area.

100001
Client:
Client Sample ID
SVL JOB #: 90001
Recv Date: 01/15/00

Figure 5-1 Sample Label

Client Sample ID
SVL #: 00001 Matrix: WATER
JOB #: 60001 Case #: XXXX
SDG #: XXXXXXXXXXXX
ICAP ANALYZE BY: 02/2/00

Figure 5-2 Digestate Label

Each batch of samples received at SVL is given a unique job number (e.g., "90001"). This job number remains with the sample throughout the analytical process. Each sample is also given a unique, sequential laboratory identification number (e.g., "200001"). The sequential nature of the laboratory identification numbers allows for quick identification of job and sample status during the analytical process. Samples are labeled with sample and Job identification numbers before being stored. For labeling examples, see Fig. 5-1. Identification labels are also affixed to digestates which contain information pertinent to analysis (for example, see Fig. 5-2).

5.3.4.4 Sample Storage and Security

Samples which require refrigeration are stored in a walk-in cooler at 4 ± 2 °C, except at times of sample preparation or analysis. Samples which do not require refrigeration are stored in a sample storage annex. Samples are retained at SVL for a minimum of 30 days (or longer if required by the client) after a data report is issued to the client. At the end of the specified period, samples are returned to the client or discarded according to the procedures outlined in the SOP SVL 1001.

5.4 Reagents, Standards, Gases, and Water

In an effort to keep contamination to a minimum, SVL recognizes the importance of using quality materials in the analytical process. Detailed below are descriptions of the procedures practiced at SVL to maintain contaminant free reagents, standards, gases, and water.

5.4.1 Reagent Chemicals

The most significant source of sample contamination for trace metal and organic analyses results from the acids and solvents used in digestion and extraction, respectively. To minimize this potential for contamination, SVL uses BAKER INSTRA-ANALYZED™ or better grade reagents for all environmental analyses. Solvents used for organic analyses are of GC grade purity.

Analysts are trained in the proper procedures for handling reagents to avoid accidents and contamination. The practice of these few simple rules will prevent bulk contamination: scoopulas, spatulas, pipettes are never used in reagent bottles; an approximate amount of reagent required is dispensed into a secondary vessel; reagents are never dispensed directly from the reagent container; and excess reagent is discarded, not returned to the bottle.

5.4.2 Standards

The sources and quality of all standards, reagents, and chemicals used by SVL are documented. A record is maintained which indicates the name of the person preparing a standard, the source of the standard being used, weight or volume measurements, units, and dilutions. A separate laboratory equipped with sink and hood is dedicated to standard preparation. Standards are not stored in either the standard preparation or sample storage areas.

External reference standards are routinely obtained from commercial sources. A Certificate of Analysis is required. These standards are used to check and document the concentration of calibration standards and for method validation.

5.4.3 Laboratory Gases

All carrier, oxidant, and fuel gases used by SVL meet or exceed instrument manufacturers' specifications. Gases are stored in a remote, secure area of the laboratory. Appropriate precautions are taken to prevent attaching incorrect cylinders to manifold systems. Each manifold is labeled and used for one type of gas only. Carrier gas supply lines for organic analyses include in-line purifier traps.

5.4.4 Laboratory Water

The primary general use water in the laboratory is furnished by a reverse osmosis system followed by a micropore filter with an ion-exchange resin cartridge. This satisfies the specifications of ASTM Type II water. When Type I (16.67 MΩ-cm) water is required, SVL uses a four-cartridge ion-exchange system. Reagent water used for organic analyses is obtained via a Nano-Pure™ water purifier system. This water source is regularly screened for method specific contaminants.

5.5 Calibration and Maintenance of Analytical Equipment

The following are descriptions of key instruments of concern which detail the routine calibration and maintenance procedures employed at SVL.

5.5.1 Analytical Balances

The calibration of each balance is checked each day of use with a single class "A" weight and weekly with a set of three class "A" weights. The balances are checked monthly with three Class "S" weights. They are calibrated annually by an independent contractor. Upon completion of this annual calibration, a calibration status label is affixed to each balance.

5.5.2 UV/Visible Spectrometers

Spectrometers are operated in accordance with the manufacturer's instructions. Calibration of these instruments is performed annually by an independent contractor. In addition the following steps are taken to ensure instrument control: Instruments are checked for proper wavelength and optical alignment, all absorption cells are optically matched and kept scrupulously clean, free of scratches, fingerprints, smudges, and evaporated film residues. Method specific verification or confirmation is performed as prescribed by each method.

5.5.3 Atomic Absorption Spectrometers

Maintenance of Atomic Absorption Spectrophotometers is performed according to manufacturer's recommendations and recorded in an instrument specific maintenance logbook. Calibration curves are established from analysis of three standards. The initial calibration verification (ICV) is made from a second source standard. A continuing calibration blank (CCB) and a continuing calibration verification (CCV) are analyzed at a frequency of 10%.

5.5.4 Inductively Coupled Plasma Spectrometers

Maintenance of the Inductively Coupled Plasma Spectrometers is performed according to manufacturer's specifications and recorded in an instrument specific logbook. The calibration procedure includes the establishment of a two point calibration curve, a CCB, CCV, and a second source ICV. Check samples are performed at a frequency of 10%.

5.5.5 Ion Chromatographs

The Ion Chromatographs are operated in accordance with manufacturer's instructions. The instrument is calibrated with a minimum of four standards after maintenance of the instrument and after significant retention time drift. The calibration curve is verified daily with a standard from an independent source. In addition, a CCB and a CCV are performed at a frequency of 10%.

5.5.6 Gas Chromatographs

Operation and maintenance of the various Gas Chromatographs are detailed in standard operating procedures (SOPs). Recommended manufacturer's maintenance schedules are followed and documented in the instrument-specific logbooks. A routine GC & GC/MS calibration consists of: an initial multi-point calibration to establish the calibration curve, a daily or continuing calibration to verify the calibration, and a calibration verification at the end of the analytical sequence. The frequency of the continuing calibration for the GC is, at a minimum, once every twenty samples. Continuing calibration for the GC/MS occurs at least every twelve hours.

5.6 Quality Control Parameters

SVL offers three levels of data report packages. A Level 1 report consists of analytical results; associated QC data are not included in this report. A Level 2 report consists of a standard report of analytical results with associated QC data (blank, replicate, spike, and control standard, as appropriate). A Level 3 report is virtually identical to a USEPA CLP data package.

5.6.1 Blanks

Preparation blanks are analyzed with every batch of twenty or fewer samples or each matrix type, whichever is more frequent. A preparation blank consists of laboratory pure water that is processed through all procedures, materials, and labware used for sample preparation and analysis. In cases of non-aqueous samples, reagent blanks serve as preparation blanks. Sample batches that contain contaminated blanks are routinely re-prepared, if sufficient sample remains.

5.6.2 Laboratory Control Samples

A laboratory control sample (LCS) is a sample of known value, usually from a source different from the calibration standards, used to validate the analytical procedure. One LCS is analyzed with every batch of twenty or fewer samples or each matrix type, whichever is more frequent. Sample batches containing LCS's that are out of control limits are re-analyzed, if sufficient sample remains. Control limits for solid LCS's are set by the supplier. Water or other aqueous LCS's have control limits of 80% to 120%, or as specified in the standard operating procedure.

5.6.3 Sample Replicates

These are aliquots made in the laboratory of the same sample, each aliquot is treated exactly the same throughout the analytical method. The relative percent difference (RPD) between the values of the duplicates, as calculated below, is taken as a measure of the precision of the analytical method.

$$RPD = \frac{|S - D|}{(S + D) \div 2} \times 100$$

where RPD = Relative Percent Difference
S = First Sample Value (original)
D = Second Sample Value (duplicate)

One duplicate sample or matrix spike duplicate is analyzed with every batch of twenty or fewer samples or each matrix type, whichever is more frequent. The tolerance limit for RPD is typically less than 20%. However, the duplicate is also a measure of the homogeneity of the sample matrix. An abnormally high RPD may be an indication of a non-homogeneous sample.

5.6.4 Check Standards and Controls

A check standard is prepared in the same manner as a calibration standard. The concentration is usually mid-range for the specific calibration curve. Controls are used to validate an existing calibration curve, and also typically fall mid-range on the calibration curve. The control is from a different source than that of the calibration standards or check standard. The USEPA CLP program identifies a "control" as the "initial calibration verification standard" (ICV) and the "check standard" as the "continuing calibration verification standard" (CCV). Check standards are run at a frequency of 10%. The check standard provides information on the accuracy of instrumental performance and response consistency independent of sample matrix and preparation.

For organic analysis, a calibration check standard is analyzed at regular intervals as specified by the method, usually every twelve hours of run time. The results of the calibration check standard are evaluated to ensure that instrument calibration is within acceptable limits. This standard solution is prepared from the same reference materials as the initial calibration standards.

5.6.5 Matrix Spikes and Surrogates

A matrix spike is prepared by adding a known amount of a pure compound to the sample prior to digestion or extraction. The calculated percent recovery of the matrix spike is considered to be a measure of the relative accuracy of the total analytical method, i.e., sample preparation and analytical procedure.

An analytical spike is prepared by adding a known amount of analyte to a digestate or extract of a sample for which the analyte concentration has been determined. This spike reveals the interferences found in the prepared sample matrix. The calculated percent recovery of the analytical spike is considered to reflect the accuracy of the analytical procedure only. Both the matrix spike and the analytical spike are also an indication of the effect of the sample matrix on the ability of the methodology to detect the specific analyte. When no change in volume due to the spike occurs, it is calculated as follows:

$$\% \text{ Recovery} = \frac{(\text{SSR} - \text{SR})}{\text{SA}} \times 100$$

where SSR = Spiked Sample Result
SR = Sample Result
SA = Spike Added

Tolerance limits for percent recoveries are established by client data quality objectives, but are usually 80-120% or 75-125%. Matrix spike samples are prepared for every batch of twenty or fewer samples.

Surrogates measure extraction or preparation efficiency. They must be a compound not expected to be present in the sample. The recovery of a surrogate compound must meet the control limits specified in the standard operating procedure.

5.6.6 Low Level Standards

As detection limits continue to drop and risk-assessment based criteria are used more frequently, it is increasingly important to have reliable data near the instruments detection limit. Standards at the reporting limit are employed to better assess the quality of data at these concentrations.

5.6.7 Interference Check Samples

For analytes determined by ICP spectroscopy, an interference check sample (ICS) is analyzed at the beginning and at the end of an analysis sequence. This sample consists of elements (usually Ca, Mg, Al, and Fe) at elevated levels to check for interferences due to common matrix elements. In cases where no analyte is present in the ICS, instrumental values should be $\pm 5x$ the IDL, otherwise the instrumental value should be within $\pm 20\%$ of the true value.

5.6.8 Completeness and Usability

Completeness describes the percentage of measurements that meet quality control acceptance criteria for requested determinations. Percentage completeness is defined by client data quality objectives, but SVL strives for 100% completeness of calibration verification, laboratory control samples, blanks, interference check samples, and low-level standards. For spikes, duplicates, duplicate spikes, and other QC samples that are matrix dependent, SVL follows CLP guidelines to qualify data. Clients may define more rigid acceptance limits and corrective action. A completeness criteria of 90% is used for aqueous matrices, excluding Sb and Ag.

Usability describes the percentage of measurements that can be used for making decisions based on reported values. In many cases, estimated values are sufficient to characterize certain analytes in a sample. We believe the client is the best judge in interpreting the usability of their data and therefore make no attempt to set guidelines for this parameter.

5.6.9 QA Reports

The QA Coordinator shall prepare a written report to the Laboratory Director and technical staff on a quarterly basis. The report will review recurring QA issues, discuss performance evaluation samples, summarize the findings from any internal audits, and summarize issues regarding state accreditations or arising from site visits. In addition, the report will cover recent modifications in QA policy and general lab practices.

5.6.10 Control Charts

Control charts are maintained for Laboratory Control Samples for selected analytes. A standard X bar control chart is used to plot LCS results. Upper and lower warning limits of $\pm 2s$ (where s equals standard deviation) and upper and lower control limits of $\pm 3s$ are calculated with no less than fifteen measurements. An analytical run is considered out of control when: any one point is outside control limits or when any obvious cyclic pattern is seen in the points.

5.7 Audits

The success of any QA program is driven by its ability to monitor the effectiveness of the quality systems in practice.

5.7.1 Performance Evaluations

5.7.1.1 Internal Performance Evaluations

The Quality Assurance Coordinator conducts internal performance evaluations for commonly analyzed parameters. The PE samples are logged-in as double-blinds. Results will be reported to the Laboratory Director.

5.7.1.2 External Performance Evaluations

SVL participates in two WS and two WP performance evaluation studies each year. We also participate in Soil, DMR-QA, and Underground Storage Tank PE studies. Copies of recent results are available upon request.

5.7.2 System Audits

The Quality Assurance Coordinator conducts an internal system audit each year. These audits provide a thorough overview of implementation of the Quality Assurance Plan within the laboratory.

The Quality Assurance Coordinator prepares an audit plan, with consideration of information gained during previous audits. The audit plan shall define participating auditors, applicable documents, the audit schedule, and the scope of laboratory activities to be audited. The Quality Assurance Coordinator shall use a written checklist of audit questions. Each question must be answered yes, no, or not applicable, and may be accompanied by appropriate comments.

At the close of the audit, a post-audit meeting shall be held to discuss the audit findings. The auditor can close a finding during this discussion if the laboratory staff can satisfactorily demonstrate that the finding is inappropriate.

The Quality Assurance Coordinator shall prepare an audit report for the Laboratory Director which documents the following: date and location of audit; persons contacted in the laboratory; laboratory operations audited; findings requiring corrective action; and a due date for the corrective action plan. Each finding must then be corrected and closed. The Quality Assurance Coordinator shall verify that corrective action has been successful by direct observation.

During the course of system audits, the Quality Assurance Coordinator shall be cognizant of recurring quality issues and trends which could affect quality. Recurring issues and trends should be addressed in the audit report. Correction for such events may require a review of the adequacy of the QAP. If the inherent problem lies within the QAP, the plan shall be amended through appropriate revision of Quality Assurance documents.

5.7.3 Data Audit

The QA Coordinator shall perform a data audit of at least 10 data packages each year. The purpose of the data audit is to alert the QA Coordinator to chronic problems and trends that may be developing. The QA Coordinator performs a complete review of the data contained in the report, verification of the chain-of-custody holding times, and quality control.

5.8 Corrective Action

When a QC parameter fails acceptance criteria during the course of analysis, the analyst or supervisor resolves the problem before reporting data. The supervisor may arrange for service or repair of instrumentation, if needed. For serious problems, the supervisor may report problems to the Quality Assurance Coordinator as a "Quality Issue". The Quality Assurance Coordinator must then document steps taken to resolve the "Quality Issue".

If there is a non-acceptable result in a performance evaluation sample, the Quality Assurance Coordinator works with the analysts and supervisors to discover the cause, and documents the failure as a "Quality Issue". If required, the Quality Assurance Coordinator prepares a corrective action report for accrediting agencies.

If there are findings from an internal audit, the Laboratory Director and supervisors prepare a corrective action plan. The Quality Assurance Coordinator evaluates the corrective action and then verifies that it has been successfully implemented.

5.9 Standard Operating Procedures

It is the policy of SVL to create and maintain standard operating procedures (SOPs) that are useful, accurate, current, and accessible to all employees at SVL. To this end, SVL endeavors to incorporate the input of analysts, staff and/or those most closely involved with the tasks outlined in the SOPs.

To obtain reliable results and ensure reproducibility, SVL generates, distributes and uses accurate and effective SOPs. The appropriate supervisor or director reviews each SOP draft for technical accuracy. The Quality Assurance Coordinator reviews SOPs to ensure that they are in compliance with the appropriate published method, any other applicable regulations, and that they conform to SVL's QA program. In the event that a draft SOP fails to meet any of these requirements, it is denied approval by the QA office, returned to the appropriate personnel for modification.

The numbering system for SOPs is comprised of seven characters: the letters SVL followed by a four digit, unique number in the following categories:

- 1000 series - Quality Assurance and Safety
- 2000 series - Sample and Data Management
- 3000 series - Organic Procedures
- 4000 series - Inorganic Procedures
- 6000 series - Mineral Division Procedures

As new procedures are generated, the QA office determines the appropriate category and assigns the next consecutive number for that category.

6. DATA MANAGEMENT

SVL utilizes state of the art networking software

SVL utilizes state of the art networking software (Novell NetWare® 3.11™ & 4.11™) and hardware to integrate laboratory operations from sample receiving to report generation. Automation and connectivity enables SVL to rapidly process and manage large amounts of data. Network linked PCs are located in analytical laboratories to enable personnel to review data on individual jobs and samples, methods, and SOPs.

Analysts perform specific analyses and enter data onto benchsheets or directly into the computer system depending on the type of report desired by the client. After a set of analyses has been completed, the results are calculated according to the methods specified in the standard operating procedures. The supervisor or director reviews at least 70% of the data and quality control.

Data that will be used to create an USEPA CLP deliverables package is then loaded into a Ward Scientific software program for CLP report generation. After assembly, Contract Compliance Screening software is utilized to screen data packages for completeness and accuracy before delivery to the client. SVL has the capability of providing hardcopy and diskettes. IBM compatible diskettes are available in all EPA CLP formats, as well as popular spreadsheet and database files.

Data that will be assembled into a standard report are loaded into SVL's proprietary Sample Management system. Reports are available in a number of routine and custom hardcopy formats. ASCII, spreadsheet, and database data files are also available. If a client has a specific format, we are usually able to provide data that will merge into their previous records without problems.

All data related to each job are archived for at least 12 months after reports have been issued. This period may be longer or shorter, at the clients discretion.

7. CERTIFICATIONS

SVL maintains current accreditation with several western states

7.1 Drinking Water Accreditations

- Idaho
- Texas
- Montana
- Nevada
- Washington
- California
- Colorado
- Arizona

7.2 Environmental Accreditations

- Nevada
- Washington
- California
- Arizona

Refer to supporting documents section for copies of certificates.

8. GLOSSARY

Below you will find a list of terms used in this manual and their intended definition

Accuracy The degree of agreement of a measured value with the true or expected value of the quantity of concern.

Aliquot An exact fraction of a solution or suspension.

Bias A systematic error inherent in a method or caused by some artifact or idiosyncrasy of the measurement system. Temperature effects and extraction efficiencies are examples of the first kind. Blanks, contamination, mechanical losses, and calibration errors are examples of the latter kinds. Bias may be both positive and negative, and several kinds can exist concurrently so that net bias is all that can be evaluated, except under special conditions.

Blank An artificial sample designed to monitor the introduction of artifacts into the process. For aqueous samples, reagent water is used as a blank matrix; however, a universal blank matrix does not exist for solid samples, and therefore, no matrix is used.

Reagent Blank Aliquot of analyte-free water or solvent analyzed with the analytical batch. Prep Blanks are reagent blanks which are created at the time of sample preparation using all the reagents used in the preparation of the samples (i.e., digestion, distillation or extraction)

Method Blank Reagent blank which are put through all the steps of a specific method along with the samples.

Field Blank Randomly selected sample container that is filled with distilled water and the appropriate chemical preservative in the field.

Trip Blank A specific type of field blank. A trip blank is not opened in the field. It is a check on sample contamination originating from sample transport, shipping, and site conditions.

Blind Sample A sample submitted for analysis whose composition is known to the submitter but unknown to the analyst. A blind sample is one way to test proficiency of a measurement process.

Calibration Comparison of a measurement standard or instrument with another standard or instrument to report or eliminate by adjustment any variation (deviation) in the accuracy of the item being compared.

Check Standard A blank which has been spiked with the analyte(s) from an independent source in order to monitor the execution of the analytical method.

Contamination There are two general classifications of contamination; random and systematic. Random contamination causes imprecision in analytical results as noted by significant differences between results of duplicate analyses. Systematic contamination generally results in consistent shifts in baseline concentrations as demonstrated by field, trip or equipment blanks.

CLP The Contract Laboratory Program (CLP) created by the United States Environmental Protection Agency to perform analytical work required in support of Superfund.

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Control Limits The limits shown on a control chart beyond which it is highly improbable (within a 99.7 % probability) that a point could lie while the system remains in a state of statistical control.

Control Chart A graphical plot of test results with respect to time or sequence of measurement, together with limits within which they are expected to lie when the system is in a state of statistical control.

Detection Limit The smallest concentration/amount of some component of interest that can be measured by a single measurement with a stated level of confidence.

Double Blind A sample known by the submitter but submitted to an analyst in such a way that neither its composition nor its identification as a check sample are known to the latter.

Duplicate Samples Aliquot taken in the laboratory of the same sample, treated exactly the same throughout the analytical method. The relative percent difference (RPD) between the values of the duplicates, as calculated below, is taken as a measure of the precision of the analytical method. The relative percent difference for original sample and duplicate is calculated as follows:

$$RPD = \left[\frac{|S - D|}{\left[\frac{(S + D)}{2} \right]} \right] \times 100$$

where

RPD=Relative Percent Difference

S=First Sample Value (original)

D=Second Sample Value (duplicate)

Homogeneity The degree to which a property or substance is randomly distributed throughout a material. Homogeneity depends on the size of the sample under consideration. Thus a mixture of two minerals may be nonhomogeneous at the molecular or atomic level but homogeneous at the particulate level.

Instrument Detection Limit (IDL) The smallest concentration detectable on a specific instrument.

Laboratory Control Sample A material of known composition that is analyzed concurrently with test samples to evaluate a measurement process.

Matrix Spike A sample to which a known amount of analyte(s) has been added. Designed to provide information about the effect of the sample matrix on the digestion and measurement methodology. The spike is added prior to sample extraction/digestion and analysis. Individual component sample recoveries are calculated as follows:

$$\% \text{Recovery} = \left[\frac{(SSR - SR)}{SA} \right] \times 100$$

where

SSR = Spiked Sample Result

SR = Sample Result

SA = Spike Added

Mean The sum of all observations divided by the number of observations.

Method An assemblage of measurement techniques and the order in which they are used.

Method Detection Limit (MDL) The smallest concentration detectable by a specific method (the standards used for this determination are carried through all the steps required by the method).

Performance Audit A process to evaluate the proficiency of an analyst or laboratory by evaluation of the results obtained on known test materials.

SVL ANALYTICAL, INC.

Precision The degree of mutual agreement characteristic of independent measurements as the results of repeated application of the process under specified conditions.

Procedure A set of systematic instructions for using a method of measurement or sampling or the steps or operations associated with them.

Quality Assurance A system of activities which the purpose is to provide to the producer or user of a service the assurance that it meets defined standards of quality.

Quality Control The overall system of activities whose purpose is to control the quality of a service so that it meets the needs of users.

Relative Standard Deviation The standard deviation divided by the mean and multiplied by 100.

$$RSD = \left[\frac{s}{\bar{x}} \right] \times 100$$

Sample A representative sample of any material (aqueous, nonaqueous, or multimedia) collected from any source for which determination of composition or contamination is requested or required.

Standard Operating Procedure A procedure adopted for repetitive use when performing a specific measurement or sampling operation. It may be a standard method or one developed by the user.

Subsample A portion taken from a sample. A laboratory sample may be a subsample of a gross sample; similarly, a test portion may be a subsample of a laboratory sample.

Standard Deviation The positive square root of the variance (i.e., σ for populations and s for a sample set of the population). A measure of the average spread around the mean.

Variance The value approached by the average of the sum of the squares of deviations of individual measurements from the mean. Mathematically, it may be expressed as:

$$\frac{\sum (X_i - m)^2}{n} \rightarrow \sigma^2 \text{ as } n \rightarrow \infty$$

Ordinarily, it cannot be known but only its estimate s^2 , which is calculated by the expression:

$$s^2 = \frac{\sum (X_i - \bar{X})^2}{n - 1}$$

Warning Limits The limits on a control chart within which most of the test results are expected to lie (within a 95% probability) while the system remains in a state of statistical control.



APPENDIX

Supporting documents

SVL ACCREDITATIONS

	Nevada	Colorado	Arizona	Idaho	Montana	Texas	California	Washington
DRINKING WATER PARAMETERS								
Aluminum	X		X					
Antimony	X	X	X	X	X	X	X	X
Arsenic	X	X	X	X	X	X	X	X
Barium	X	X	X	X	X	X	X	X
Beryllium	X	X	X	X	X	X	X	X
Cadmium	X	X	X	X	X	X	X	X
Calcium	X		X				X	
Chromium	X	X	X	X	X	X	X	X
Copper	X	X	X	X	X	X	X	X
Iron	X		X				X	
Lead	X	X	X	X	X	X	X	X
Magnesium	X		X				X	
Manganese	X		X				X	
Mercury	X	X	X	X	X	X	X	X
Nickel	X	X	X	X	X	X	X	X
Potassium	X						X	
Selenium	X	X	X	X	X	X	X	X
Silver	X		X				X	
Sodium	X	X	X	X	X		X	X
Thallium	X	X	X	X	X	X	X	X
Zinc	X		X				X	
Alkalinity	X		X				X	
Cyanide	X	X	X	X	X	X	X	X
Nitrate	X	X	X	X	X	X	X	X
Nitrite	X	X	X	X	X	X	X	X
Nitrate + Nitrite	X							
Turbidity	X		X					
pH	X		X					
Chloride	X		X				X	
Fluoride	X	X	X	X	X	X	X	X
Sulfate	X		X				X	
TDS or Filterable Residue	X		X				X	
Conductivity	X		X				X	
ortho-Phosphate	X						X	

SVL ACCREDITATIONS

	Nevada	Colorado	Arizona	Idaho	Montana	Texas	California	Washington
DRINKING WATER PARAMETERS (continued)								
Hardness	X		X				X	
Silica			X				X	
Trihalomethanes	X		X	X	X	X		X
524.2 Volatile Organic Compounds by GC/MS	X	X	X	X	X	X	X	X
504.1 EDB DBCP				X	X		X	X

SVL ACCREDITATIONS

	Nevada	Colorado	Arizona	Idaho	Montana	Texas	California	Washington
WASTEWATER PARAMETERS								
Aluminum	X		X				X	X
Antimony	X		X				X	X
Arsenic	X		X				X	X
Barium	X		X				X	X
Beryllium	X		X				X	X
Boron	X		X				X	
Cadmium	X		X				X	X
Calcium	X		X				X	X
Chromium	X		X				X	X
Cobalt	X		X				X	X
Copper	X		X				X	X
Gold			X				X	
Iron	X		X				X	X
Lead	X		X				X	X
Magnesium	X		X				X	X
Manganese	X		X				X	X
Mercury	X		X				X	X
Molybdenum	X		X				X	X
Nickel	X		X				X	X
Potassium	X		X				x	X
Selenium	X		X				X	X
Silver	X		X				X	X
Sodium	X		X				X	X
Strontium	X		X					X
Thallium	X		X				X	X
Tin			X				X	
Titanium	X						X	X
Vanadium	X		X				X	X
Zinc	X		X				X	X
Acidity			X				X	X
Alkalinity	X		X				X	X
Ammonia	X		X				X	X
BOD			X				X	
Bromide								X

SVL ACCREDITATIONS

	Nevada	Colorado	Arizona	Idaho	Montana	Texas	California	Washington
WASTEWATER PARAMETERS (continued)								
COD	X						X	X
Chloride	X		X				X	x
Cyanide	X		X				X	x
Fluoride	X		X				X	x
Hardness	X		X				X	X
TKN	X		X				X	X
Nitrate	X		X				X	X
Nitrite			X				X	X
Oil&Grease or Hexane Extractable Material	X						X	X
TOC			X				X	
pH	X		X				X	X
Phenolics	X						X	X
ortho-Phosphate	X						X	X
Total Phosphorus	X		X				X	X
Total Solids							X	X
TDS or Filterable Residue	X		X				X	X
TSS or Nonfilterable Residue	X		X				X	X
Silica			X				X	X
Specific Conductance	X		X				X	X
Sulfate	X		X				X	X
Turbidity			X				X	X
TOX							X	X
601/602 Volatile Organic Compounds by GC	X		X				X	
608 Organochlorine Pesticides	X		X				X	
608 PCBs	X		X				X	
624 Volatile Organic Compounds by GC/MS	X		X				X	X
625 Semivolatile Organic Compounds by GC/MS							X	X

SVL ACCREDITATIONS

	Nevada	Colorado	Arizona	Idaho	Montana	Texas	California	Washington
PETROLEUM PARAMETERS								
Total Petroleum Hydrocarbons (Gasoline)							X	
Total Petroleum Hydrocarbons (Diesel)							X	
Total Petroleum Hydrocarbons (418.1AZ)			X					
Total Petroleum Hydrocarbons (Diesel) -- NWTPH Dx								X
Total Petroleum Hydrocarbons (Gasoline) -- NWTPH Gx								X

SVL ACCREDITATIONS

	Nevada	Colorado	Arizona	Idaho	Montana	Texas	California	Washington
RCRA PARAMETERS								
Aluminum			X					
Antimony			X				X	X
Arsenic			X				X	X
Barium			X				X	X
Beryllium			X				X	X
Cadmium			X				X	X
Calcium			X					
Chromium			X				X	X
Cobalt			X				X	X
Copper			X				X	X
Iron			X					
Lead			X				X	X
Lithium			X					
Magnesium			X					
Manganese			X					
Mercury			X				X	X
Molybdenum			X				X	X
Nickel			X				X	X
Potassium			X					
Selenium			X				X	X
Silver			X				X	X
Sodium			X					
Strontium			X					
Thallium			X				X	X
Tin			X					
Vanadium			X				X	X
Zinc			X				X	X
Fluoride							X	
Cyanide			X				X	X
TCLP			X				X	
Cation Exchange Capacity			X					
SPLP			X					
Ignitability			X					
pH			X					

SVL ACCREDITATIONS

	Nevada	Colorado	Arizona	Idaho	Montana	Texas	California	Washington
RCRA PARAMETERS (continued)								
8011 EDB DBCP			X				X	
8021B Volatile Organic Compounds by GC								
8081A Organochlorine Pesticides			X				X	X
8082 PCBs								X
8260B Volatile Organic Compounds by GCMS			X					X
8270C Semivolatile Organic Compounds by GCMS			X					X



ENVIRONMENTAL LABORATORY LICENSE

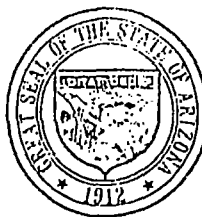
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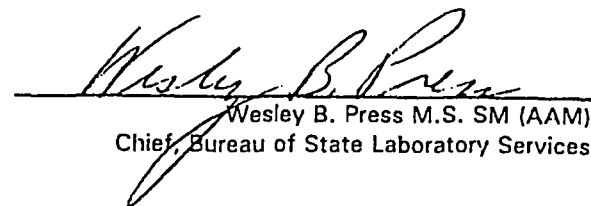
Laboratory Director: J. BLAKE JOHNSON
Owner/Representative: WAYNE SORENSEN

SVL ANALYTICAL, INC.
AZ0538

is in compliance with Environmental Laboratory's applicable standards for the State of Arizona and maintains on file a List of Parameters for which the laboratory is certified to perform analysis.

PERIOD OF LICENSURE FROM: 04/22/2001 TO 04/22/2002




Wesley B. Press M.S. SM (AAM)
Chief, Bureau of State Laboratory Services

STATE OF CALIFORNIA
DEPARTMENT OF HEALTH SERVICES

ENVIRONMENTAL LABORATORY CERTIFICATION

is hereby granted to

SVL ANALYTICAL, INC.

ONE GOVERNMENT GULCH

KELLOGG, IDAHO

to conduct analyses of environmental samples as specified in the
"List of Approved Fields of Testing and Analytes"
which accompanies this Certificate.

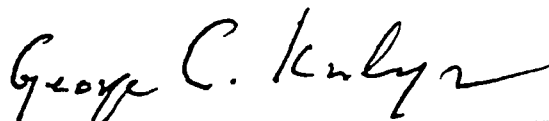
This Certificate is granted in accordance with provisions of Section 1010, et seq.
(New Section 100825) of the Health and Safety Code.

Certificate No.: 2080

Expiration Date: 08/31/2003

Issued on: 08/01/2001

at Berkeley, California,
subject to forfeiture or revocation.



George C. Kulasingam, Ph.D.
Manager
Environmental Laboratory Accreditation Program

CALIFORNIA DEPARTMENT OF HEALTH SERVICES
ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM
List of Approved Fields of Testing and Analytes

SVL ANALYTICAL, INC.
ONE GOVERNMENT GULCH
KELLOGG, ID

PHONE No. (208) 784-1258 Certificate No. 2080
Expiration Date 08/31/2001

02 Inorganic Chemistry and Physical Properties of Drinking Water

- 02.01 Alkalinity
- 02.02 Calcium
- 02.03 Chloride
- 02.04 Corrosivity
- 02.05 Fluoride
- 02.06 Hardness
- 02.07 Magnesium
- 02.09 Nitrate
- 02.10 Nitrite
- 02.11 Sodium
- 02.12 Sulfate
- 02.13A Total Dissolved Solids
- 02.13B Conductivity
- 02.17 Silica
- 02.18 Cyanide
- 02.19 Potassium

03 Analysis of Toxic Chemical Elements in Drinking Water

- 03.01 Arsenic
- 03.02 Barium
- 03.03 Cadmium
- 03.04 Chromium, total
- 03.05 Copper
- 03.06 Iron
- 03.07 Lead
- 03.08 Manganese
- 03.09 Mercury
- 03.10 Selenium
- 03.11 Silver
- 03.12 Zinc
- 03.13 Aluminum
- 03.15 Antimony
- 03.16 Beryllium
- 03.17 Nickel
- 03.18 Thallium

04 Organic Chemistry of Drinking Water by GC/MS

- 04.02A EPA Method 524.2 Regulated Volatiles
- 04.02B EPA Method 524.2 Unregulated Volatiles
- 04.02C EPA Method 524.2 Vinyl Chloride
- 04.02D EPA Method 524.2 Trihalomethanes

05 Organic Chemistry of Drinking Water (excluding GC/MS)

- 05.06 EPA Method 504.1 EDB, DBCP

10 Inorganic Chemistry and Toxic Chemical Elements of Hazardous Waste

- 10.01 Antimony
- 10.02 Arsenic
- 10.03 Barium
- 10.04 Beryllium
- 10.05 Cadmium
- 10.06 Chromium, total
- 10.07 Cobalt
- 10.08 Copper
- 10.09 Lead
- 10.10 Mercury
- 10.11 Molybdenum
- 10.12 Nickel
- 10.13 Selenium
- 10.14 Silver
- 10.15 Thallium
- 10.16 Vanadium
- 10.17 Zinc
- 10.18 Chromium (VI)
- 10.19 Cyanide
- 10.20 Fluoride

11 Extraction Tests of Hazardous Waste

- 11.03 Toxicity Characteristic Leaching Procedure (TCLP) All Classes

13 Organic Chemistry of Hazardous Waste (excluding GC/MS)

- 13.15 Total Petroleum Hydrocarbons - Gasoline (LUFT)
- 13.16 Total Petroleum Hydrocarbons - Diesel (LUFT)
- 13.17 EPA Method 418.1 TRPH - Screening by IR
- 13.18 EPA Method 8011 EDB and DBCP
- 13.25C EPA Method 8081A Organochlorine Pesticides only

16 Wastewater Inorganic Chemistry, Nutrients and Demand

- 16.01 Acidity
- 16.02 Alkalinity
- 16.03 Ammonia
- 16.05 Boron
- 16.07 Calcium
- 16.09 Chemical Oxygen Demand
- 16.10 Chloride
- 16.12 Cyanide
- 16.14 Fluoride
- 16.15 Hardness
- 16.16 Kjeldahl Nitrogen
- 16.17 Magnesium
- 16.18 Nitrate
- 16.19 Nitrite
- 16.20 Oil and Grease
- 16.21 Organic Carbon
- 16.23 pH
- 16.24 Phenols

Certificate No. 2080
Expiration Date 08/31/2001

- 16.25 Phosphate, ortho
- 16.26 Phosphorus, total
- 16.27 Potassium
- 16.28 Residue, Total
- 16.29 Residue, Filterable (Total Dissolved Solids)
- 16.30 Residue, Nonfilterable (Total Suspended Solids)
- 16.34 Sodium
- 16.35 Specific Conductance
- 16.36 Sulfate
- 16.37 Sulfide (includes total & soluble)
- 16.41 Turbidity
- 16.45 Total Organic Halides

17 Toxic Chemical Elements in Wastewater

- 17.01 Aluminum
- 17.02 Antimony
- 17.03 Arsenic
- 17.04 Barium
- 17.05 Beryllium
- 17.06 Cadmium
- 17.07 Chromium (VI)
- 17.08 Chromium, total
- 17.09 Cobalt
- 17.10 Copper
- 17.11 Gold
- 17.13 Iron
- 17.14 Lead
- 17.15 Manganese
- 17.16 Mercury
- 17.17 Molybdenum
- 17.18 Nickel
- 17.24 Selenium
- 17.25 Silver
- 17.27 Thallium
- 17.28 Tin
- 17.29 Titanium
- 17.30 Vanadium
- 17.31 Zinc

18 Organic Chemistry of Wastewater by GC/MS

- 18.01A-1 EPA Method 624 Halogenated Hydrocarbons
- 18.01B-1 EPA Method 624 Aromatic Compounds
- 18.01D-1 EPA Method 624 Other Volatile Organics

19 Organic Chemistry of Wastewater (excluding GC/MS)

- 19.01-1 EPA Method 601 Halogenated Volatiles
- 19.02-1 EPA Method 602 Aromatic Volatiles
- 19.08A-1 EPA Method 608 Organochlorine Pesticides only
- 19.08B-1 EPA Method 608 PCBs only

Colorado Department of Public Health and Environment

under Primacy Agreement with the
United States Environmental Protection Agency
Pursuant to the Safe Drinking Water Regulations, 40CFR, Part 141

Certifies

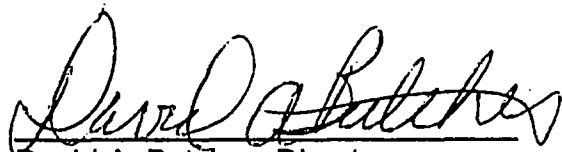
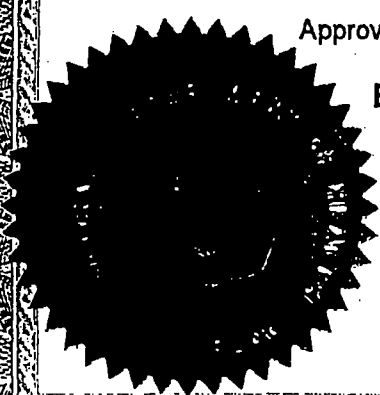
**SVL ANALYTICAL, INC.
One Government Gulch
Kellogg, Idaho 83837**

is in compliance with the criteria and procedures of the EPA, Manual for the Certification of Laboratories Analyzing Drinking Water.
The laboratory may perform **Chemistry Analysis** on public drinking water for the following analyte groups:

Trace Metals(TM1,TM2), Nitrate, Nitrite, Fluoride, THM, VOC(V1, V2), Cyanide

Approved analytes and methods are specified on certification list of September 1, 2001

EFFECTIVE: September 1, 2001 through August 31, 2002



David A. Butcher, Director
Laboratory and Radiation Services Division

CERTIFICATION STATUS (CHEMISTRY) SAFE DRINKING WATER ACT

Name: SVL Analytical, Inc.
PO Box 929 - One Government Gulch
Kellogg, Idaho 83837

Date: September 1, 2001

TRACE METALS METHOD

TM1

(A)Arsenic	EPA200.9
(A)Barium	EPA200.7
(A)Cadmium	EPA200.7
(A)Chromium	EPA200.7
(A)Lead	EPA200.9
(A)Mercury	EPA245.1
(A)Selenium	EPA200.9

TM2

(A)Antimony	EPA200.9
(A)Beryllium	EPA200.7
(A)Copper	EPA200.7
(A)Nickel	EPA200.7
(A)Thallium	EPA200.9

NITRATE/NITRITE/FLUORIDE

N/N/F

(A)Nitrate-N	EPA300.0
(A)Nitrite-N	EPA300.0
(A)Fluoride-F	EPA300.0

PESTICIDES

P1

(N)Endrin
(N)Lindane
(N)Methoxychlor
(N)Toxaphene

P2

(N)Alachlor
(N)Atrazine
(N)Chlordane
(N)Heptachlor
(N)Heptachlor Epoxide
(N)Hexachlorobenzene
(N)Hexachloro-
cyclopentadiene
(N)Simazine

CARBAMATES/VYDATE

C/V

(N)Carbofuran
(N)Oxamyl(Vydate)

HERBICIDES

H1

(N)2,4-D
(N)2,4,5-TP

H2

(N)Dalapon
(N)Dinoseb
(N)Pentachlorophenol
(N)Picloram

PCB

(N)Decachlorobiphenyl

PAH

(N)Benzo(a)pyrene

ADIPATES/PHTHALATES

A/P

(N)Bis-(2-ethylhexyl) Adipate
(N)Bis-(2-ethylhexyl) Phthalate

(A) = Approved / Certified
(N) = Not Certified
(P) = Provisionally Certified
(I) = Interim Certified

Name: SVL Analytical, Inc.
PO Box 929 - One Government Gulch
Kellogg, Idaho 83837

Date: September 1, 2001

<u>THM</u>	<u>METHOD</u>	<u>MISCELLANEOUS</u>	<u>METHOD</u>
(A)Bromodichloromethane	EPA524.2	(N)Diquat	
(A)Bromoform	EPA524.2	(N)Endothall	
(A)Chlorodibromomethane	EPA524.2	(N)Glyphosate	
(A)Chloroform	EPA524.2	(N)Asbestos	
	EPA524.2	(N)Dioxin	
		(A)Cyanide	EPA335.4

REGULATED VOC

V1

(A)Benzene	EPA524.2
(A)Carbon Tetrachloride	EPA524.2
(A)1,2-Dichlorobenzene	EPA524.2
(A)1,2-Dichloroethane	EPA524.2
(A)1,1-Dichloroethylene	EPA524.2
(A)Trichloroethylene	EPA524.2
(A)Vinyl Chloride	EPA524.2

V2

(A)Chlorobenzene	EPA524.2
(A)1,4-Dichlorobenzene	EPA524.2
(A)c-1,2-Dichloroethylene	EPA524.2
(A)t-1,2-Dichloroethylene	EPA524.2
(A)1,2-Dichloropropane	EPA524.2
(A)Ethylbenzene	EPA524.2
(A)Styrene	EPA524.2
(A)Tetrachloroethylene	EPA524.2
(A)Toluene	EPA524.2
(A)1,1,1-Trichloroethane	EPA524.2
(A)Xylenes (Total)	EPA524.2
(A)Dichloromethane	EPA524.2
(A)1,2,4-Trichlorobenzene	EPA524.2
(A)1,1,2-Trichloroethane	EPA524.2

V3

(N)1,2-Dibromo3-chloropropane
(N)Ethylene Dibromide

(A) = Approved / Certified
(N) = Not Certified
(P) = Provisionally Certified
(I) = Interim Certified



STATE OF IDAHO

DEPARTMENT OF HEALTH AND WELFARE

WATER QUALITY LABORATORY CERTIFICATION

For

July 1, 2001 through June 30, 2002

Year

SVL Analytical

Laboratory

One Government Gulch

Address

Kellogg, ID 83837

CITY/STATE

This is to certify that the above named laboratory has met the requirements provided in Chapter 1, Title 39 of the Idaho Code [101, 102, 103, and 105] and the rules and regulations governing certification of Idaho Water Quality Laboratories as approved by the Idaho State Board of Health and Welfare. This certification applies to testing of public drinking water for the following parameters:

Water Chemistry – See Attached list of Parameters and Methods

Richard P. Hudson
Chief, Bureau of Laboratories



State of Idaho
DEPARTMENT OF HEALTH AND WELFARE
Division of Health

Bureau of Laboratories

2220 Old Penitentiary Rd.
Boise, Idaho 83712
(208) 334-2235

DIRK KEMPTHORNE

Governor

KARL B. KURTZ

Director

RICHARD H. SCHULTZ

Administrator

DRINKING WATER LABORATORY CERTIFICATION

SVL Analytical Laboratories, Inc.
One Government Gulch
Kellogg, Id 83837-0929

Issued: September 5, 2001
Expiration: June 30, 2002
(or until revised)

List of Analytes	Status ¹	Methods
<u>Inorganic Chemicals</u>		
Antimony	C	200.9
Arsenic	C	200.9
Barium	C	200.7
Beryllium	C	200.7
Cadmium	C	200.7
Chromium	C	200.7
Copper	C	200.7
Lead	C	200.9
Mercury	C	245.1
Nickel	C	200.7
Selenium	C	200.9
Sodium	C	200.7
Thallium	C	200.9
Cyanide	C	335.4
Fluoride	C	300.0
Nitrate	C	300.0, 353.2
Nitrite	C	300.0
<u>Volatile Organic Chemicals</u>		
Dibromochloropropane (DBCP)	*	
Ethylene Dibromide (EDB)	*	
Total Trihalomethanes (TTHM's)	C	524.2
VOC's (Except Vinyl Chloride)	C	524.2
Vinyl Chloride	C	524.2
<u>Synthetic Organic Chemicals</u>		
<u>Pesticides</u>		
Alachlor	*	
Atrazine	*	
Chlordane	*	
Endrin	*	
Lindane	*	
Heptachlor	*	
Heptachlor Epoxide	*	
Hexachlorobenzene	*	
Hexachlorocyclopentadiene	*	
Methoxychlor	*	
Simazine	*	
Toxaphene	*	
<u>Herbicides</u>		
2,4-D	*	
2,4,5-TP (Silvex)	*	
Dalapon	*	
Dinoseb	*	
Pentachlorophenol	*	
Picloram	*	
<u>Carbamates</u>		
Carbofuran	*	
Oxamyl (Vydate)	*	
<u>Miscellaneous</u>		
Adipates	*	
Phthalates	*	
Polynuclear Aromatic Hydrocarbons	*	
Polychlorinated Biphenyl's (PCB's)	*	
Diquat	*	
Endothall	*	
Glyphosate	*	

1) C = Certified, N = Not Certified, P = Provisionally Certified, * = Certification Not Requested



Printed on
recycled paper.



Recognizes that

SVL ANALYTICAL

has completed the requirements for Montana certification and is licensed to analyze Montana's Public Drinking Water Supplies. See attached listing.

Montana Certification Number: CERT0027

Expiration Date: 6/30/2001

A handwritten signature in cursive script, reading "Judy Halm", written over a horizontal line.

Judy Halm
Laboratory Certification Officer
DPHHS Environmental Laboratory

**STATE OF NEVADA HEALTH DIVISION
BUREAU OF LICENSURE AND CERTIFICATION**

**ENVIRONMENTAL LABORATORY SERVICES
LABORATORY CERTIFICATION PROGRAM**

The environmental laboratory listed on this Certificate has met the quality requirements as specified by the Nevada Administrative Code 445A and is hereby certified to conduct the analyses of water for the contaminants listed on their accepted parameter list(s) effective dates:

July 1, 2001 through July 31, 2002

**SVL Analytical Laboratory
One Government Gulch Road
Kellogg, Idaho 83837**



CERTIFICATE No. ID-19-2002-35

Jack Ruckman
Jack Ruckman Ph.D.
Laboratory Certification Officer

8/1/01
Date

Don LaFara
Donald E. LaFara
Laboratory Certification Officer

8-1-01
Date

KENNY C. GUINN
Governor

MICHAEL J. WILLDEN
Director



YVONNE SYLVA
Administrator

State Health Officer

STATE OF NEVADA
DEPARTMENT OF HUMAN RESOURCES
HEALTH DIVISION
BUREAU OF LICENSURE AND CERTIFICATION

April 22, 2002

Certified Parameter List
SDWA-CHEMISTRY

PAUL DUERKSON
SVL ANALYTICAL LABS, INC
ONE GOVERNMENT GULCH
KELLOGG ID 83837

Pursuant to regulations adopted by the State Board of Health, the State of Nevada will accept data from this laboratory for the following contaminants under the Safe Drinking Water Act. Please be advised that it is the responsibility of the laboratory to make your clientele aware of these changes. In particular it is important that the clients are aware of the loss of any previously certified parameters. If the laboratory subcontracts samples to other laboratories, it is the responsibility of the laboratory to ensure that the contracting laboratory is Nevada certified for all contracted parameters. The clients must be made aware of any subcontracted work. Your 1st quarter (2002) proficiency testing results should be submitted prior to the expiration date listed below.

This certification is effective until July 31, 2002.

Primary Inorganic Contaminants

Antimony	200.9
Arsenic	200.7, 200.9
Alkalinity	2320-B
Barium	200.7
Beryllium	200.7
Cadmium	200.7, 200.9
Chromium	200.7
Cyanide	335.4, 1667
Fluoride	300.0, 340.2
Mercury	245.1
Nickel	200.7
Nitrate	300.0, 353.2
pH	150.1
Nitrite	300.0, 353.2
Total Nitrate/Nitrite	
Selenium	200.9
Thallium	200.9
Lead	200.9
Copper	200.7
Turbidity	2130-B

Secondary Inorganic Contaminants

Boron	200.7
Manganese	200.7
Iron	200.7
Sodium	200.7
Calcium	200.7
Magnesium	200.7
Conductivity	2510-B
Molybdenum	200.7
Zinc	200.7
T. Phosphorus	365.2
Chloride	300.0
Sulfate	300.0
Silver	200.7
Aluminum	200.7
Ca-Hardness	200.7
T. Hardness	200.7
Potassium	200.7
TDS	2540-C
Color	2120-B
Vanadium	200.7

Page 1 of 2

Building and Strengthening Public Health through Communication and Partnerships

April 22, 2002

STATE OF NEVADA
Certified Parameter List
SDWA-CHEMISTRY


PAUL DUERKSON
SVL ANALYTICAL LABS, INC
ONE GOVERNMENT GULCH
KELLOGG ID 83837

Organics

Trihalomethanes	524.2
Regulated VOCs	524.2
Unregulated VOCs	524.2
Vinyl Chloride	524.2

Summary of Changes: None

-----END OF REPORT-----


Donald E. LaFara
Laboratory Certification Officer
Nevada State Health Division

4-22-02
Approved

(775) 687-4670

TDD 687-4678

Administration
Facsimile 687-5856Water Pollution Control
Facsimile 687-4684Mining Regulation and
Reclamation
Facsimile 684-5259Waste Management
Corrective Actions
Federal FacilitiesAir Pollution Control
Air Quality Planning
Water Quality Planning

Facsimile 687-6396

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL PROTECTION

333 W. Nye Lane, Room 138

Carson City, Nevada 89706

Accepted Parameter List
CHEMISTRY

June 21, 2002

PAUL DUERKSEN
SVL ANALYTICAL LABS, INC
ONE GOVERNMENT GULCH
KELLOGG ID 83837

Pursuant to regulations adopted by the State Environmental Commission, the State of Nevada will accept data from this laboratory for the following contaminants under the Clean Water Act. Please be advised that it is the responsibility of the laboratory to make your clientele aware of changes. In particular it is important that the clients are aware of the loss of any previously certified parameters. If the laboratory subcontracts samples to other laboratories, it is the responsibility of the laboratory to ensure that the contracting laboratory is Nevada certified for all contracted parameters. The clients must be made aware of any subcontracted work. This certification is effective until July 31, 2002.

<u>Metals</u>	<u>Methods</u>	<u>Minerals</u>	<u>Methods</u>
Aluminum	200.7	pH	150.1
Antimony	200.7, 204.2	Conductivity	120.1
Arsenic	200.7, 206.2	TDS @ 180°	160.1
Barium	200.7	Alkalinity	2320 B
Beryllium	200.7	Calcium	200.7
Boron	200.7	Magnesium	200.7
Cadmium	200.7, 213.2	Potassium	200.7
Chromium	200.7	Sodium	200.7
Mercury	245.1	Chloride	300.0
Cobalt	200.7	Fluoride	340.2, 300.0
Iron	200.7	Sulfate	300.0
Lead	200.7, 239.2	Acidity	2310 B
Manganese	200.7	Total Hardness	200.7
Zinc	200.7	Calcium Hardness	200.7
Strontium	200.7	Total Phosphorous	365.2
Thallium	200.7, 279.2	Kjeldahl Nitrogen	351.4
Titanium	200.7	ortho-phosphate	365.2
Vanadium	200.7	<u>BNAs</u>	625
Molybdenum	200.7		
Nickel	200.7	<u>Demands</u>	
Selenium	200.7, 270.2	COD	410.4
Silver	200.7	BOD	5210-B
Tin	200.7		
Copper	200.7		

STATE OF NEVADA
CERTIFIED PARAMETER LIST
CHEMISTRY

PAUL DUERKSEN
SVL ANALYTICAL LABS, INC
ONE GOVERNMENT GULCH
KELLOGG ID 83837
June 21, 2002

<u>Volatile Aromatics</u>	<u>Methods</u>
Benzene	602, 624
Chlorobenzene	601, 624
Ethylbenzene	602, 624
Toluene	602, 624
1,2 Dichlorobenzene	624
1,3 Dichlorobenzene	624
1,4 Dichlorobenzene	624
Xylenes	602, 624

<u>Volatile Halocarbons</u>	
Methylene Chloride	601, 624
1,1-Dichloroethane	601, 624
Carbon Tetrachloride	624
Dibromochloromethane	601, 624
1,2 Dichloroethane	601, 624
Trichloroethene	624
1,1,1 Trichloroethane	624
Chloroform	601, 624
Tetrachloroethene	601, 624
Bromoform	601, 624
Bromodichloromethane	601, 624

<u>Miscellaneous</u>	<u>Methods</u>
Total Cyanide	335.2
Cyanide	1677
NFR (TSS)	160.2
Oil & Grease	1664
Total Phenolics	420.1
Total Solids	160.3

<u>PCB/Water/Oil</u>	
1016 1242	608
1221 1248	
1232 1254	
1260	

<u>Pesticides</u>	
Aldrin	608
Chlordane	
DDT	
Dieldrin	
DDE	
DDD	
Endrin	
Heptachlor	
Heptachlor Epoxide	
Methoxychlor	


Summary of Parameter List Changes

Add: BOD, ortho-phosphate

-----END OF REPORT-----

Recommended: June 21, 2002

Approved: June 21, 2002



Donald E. LaFara
Laboratory Certification Officer
Nevada State Health Division



Tom Porta P.E., Bureau Chief
Water Quality Planning
Division of Environmental Protection



Texas Department of Health

William R. Archer III, M.D.
Commissioner of Health

1100 West 49th Street
Austin, Texas 78756-3199
(512) 458-7111
<http://www.tdh.state.tx.us>

Charles E. Bell, M. D.
Executive Deputy Commissioner

SCOPE OF CERTIFICATION TX241-2000A

SVL Analytical, Inc.
One Government Gulch
P.O. Box 929
Kellogg, ID 83837
(208) 784-1258
Lab ID Number: TX241

Drinking Water Laboratory Certification

Chemistry Categories
Effective Date: July 31, 2000
Expiration Date: July 31, 2002
Page 1 of 1

Routine Inorganics

Fluoride EPA 300.0, SM 4500-F-C
Cyanide EPA 335.4

Nitrate and Nitrite

Nitrate-N EPA 300.0, EPA 353.2
Nitrite-N EPA 300.0, EPA 353.2

Metals

Antimony EPA 200.9
Arsenic EPA 200.9
Barium EPA 200.7
Beryllium EPA 200.7
Cadmium* EPA 200.7*
Chromium EPA 200.7
Mercury EPA 245.1
Nickel EPA 200.7
Selenium EPA 200.9
Sodium EPA 200.7
Thallium* EPA 200.9*

Lead and Copper

Copper EPA 200.7
Lead EPA 200.9

Total Trihalomethanes EPA 524.2

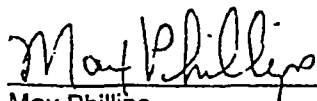
Volatile Organics

Benzene EPA 524.2
Carbon tetrachloride EPA 524.2
Chlorobenzene EPA 524.2
1,2-Dichlorobenzene EPA 524.2
1,4-Dichlorobenzene EPA 524.2
1,2-Dichloroethane EPA 524.2
1,1-Dichloroethylene EPA 524.2
cis-1,2-Dichloroethylene EPA 524.2
trans-1,2-Dichloroethylene EPA 524.2
Dichloromethane EPA 524.2
1,2-Dichloropropane EPA 524.2
Ethylbenzene EPA 524.2
Styrene EPA 524.2
Tetrachloroethylene EPA 524.2
Toluene EPA 524.2
1,1,1-Trichloroethane EPA 524.2
1,1,2-Trichloroethane EPA 524.2
Trichloroethylene EPA 524.2
1,2,4-Trichlorobenzene EPA 524.2
Vinyl chloride EPA 524.2
Total Xylenes EPA 524.2

EDB and DBCP

1,2-Dibromo-3-chloropropane EPA 504.1
Ethylene dibromide EPA 504.1

*Certified for non-composite samples only.



Max Phillips
Laboratory Certification Officer

This certificate is the property of the Department and must be surrendered within seven days if the laboratory is decertified in whole or in part or withdraws voluntarily from certification. Continued certification status is contingent on successful ongoing participation in the program. Customers are encouraged to verify the above certificate by contacting the Department.

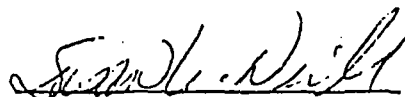
The Texas Department of Health

This is to certify that

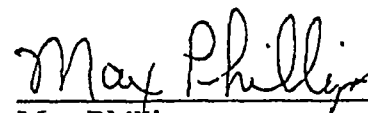
SVL Analytical, Inc. (TX241)
One Government Gulch
Kellogg, Idaho 83837

having complied with 25 TAC §73.24, Certification of Drinking Water, Milk, and Shellfish Laboratories, is hereby certified to conduct chemistry analysis of drinking water samples as specified in the attached cover letter and Scope of Certification.

Certificate Number: TX241-2000A
Effective Date: July 31, 2000
Expiration Date: July 31, 2002



Susan U. Neill
Acting Chief, Bureau of Laboratories



Max Phillips
Laboratory Certification Officer

This certificate and all attachments are the property of the Texas Department of Health and must be surrendered within seven days if the laboratory is decertified in whole or in part or withdraws voluntarily from certification. Continued certification status is contingent on successful ongoing participation in the program. Customers are encouraged to verify the above certificate by contacting the Texas Department of Health.

The State of
Department



Washington
of Ecology

This is to certify that

SVL Analytical, Incorporated
Kellogg, ID

has complied with provisions set forth in Chapter 173-50 WAC and is hereby recognized by the Department of Ecology as an ACCREDITED LABORATORY for the analytical parameters listed on the accompanying Scope of Accreditation. This certificate is effective May 17, 2002, and shall expire May 16, 2003.

Witnessed under my hand on June 17, 2002.

Perry F. Brake, Chemist
Lab Accreditation Unit Supervisor

Lab Accreditation Number
C074

Scope of Accreditation

SVL Analytical, Incorporated

Kellogg, ID

is accredited by the State of Washington Department of Ecology to perform analyses for the parameters listed below using the analytical methods indicated. This Scope of Accreditation applies to non-potable water analyses only. Accreditation for all parameters is final unless indicated otherwise in a note. Accreditation is for the latest version of a method unless otherwise specified in a note. EPA refers to the U.S. Environmental Protection Agency. SM refers to American Public Health Association's publication, Standard Methods for the Examination of Water and Wastewater, 18th edition, unless otherwise noted. ASTM stands for the American Society of Testing and Materials. PSEP stands for Puget Sound Estuary Program. Other references are detailed in the notes section.

Parameter Name	Reference	Method Number	Notes
Alkalinity, Total	SM	2320 B(4a)	
Ammonia	EPA	350.1	2
Ammonia	EPA	350.3	
Bromide	EPA	300.0	
Chemical Oxygen Demand (COD)	EPA	410.4(7.3)	
Chloride	EPA	300.0	
Color	EPA	110.2	
Cyanide, Available	EPA	OIA-1677	3
Cyanide, Total	EPA	335.2(8.7)	
Cyanide, Total	EPA	9012	
Fluoride	EPA	340.2	
Hexane Extractable Material	EPA	1664	2
Nitrate	EPA	300.0	
Nitrate	EPA	353.2	
Nitrate + Nitrite	EPA	300.0	
Nitrate + Nitrite	EPA	353.2	
Nitrite	EPA	300.0	
Nitrite	EPA	353.2	
Nitrogen, Total Kjeldahl	EPA	351.4	2
Orthophosphate	EPA	365.2	
pH	EPA	150.1	
Phenolics, Total Recoverable	EPA	420.1	
Phosphorus, Total	EPA	365.2	
Solids, Total Dissolved	EPA	160.1	
Solids, Total Suspended	EPA	160.2	

Washington State Department of Ecology

Laboratory Accreditation Unit

Date Printed: 8/19/2002

Page 1 of 4

Scope of Accreditation Report for SVL Analytical, Incorporated

Scope Expires: 5/16/2003

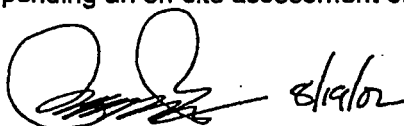
Parameter Name	Reference	Method Number	Notes
Solids, Total Volatile	EPA	160.4	
Specific Conductance	EPA	120.1	
Sulfate	EPA	300.0	
Sulfide	EPA	376.1	
Total Organic Carbon	EPA	415.1	
Total Organic Halides	EPA	9020	
Turbidity	EPA	180.1	
Aluminum	EPA	200.7	
Aluminum	EPA	6010	
Antimony	EPA	200.7	
Antimony	EPA	204.2	
Antimony	EPA	6010	
Antimony	EPA	7041	
Arsenic	EPA	200.7	
Arsenic	EPA	206.2	
Arsenic	EPA	6010	
Arsenic	EPA	7060	
Barium	EPA	200.7	
Barium	EPA	6010	
Beryllium	EPA	200.7	
Beryllium	EPA	6010	
Boron	EPA	200.7	
Boron	EPA	6010	
Cadmium	EPA	200.7	
Cadmium	EPA	213.2	
Cadmium	EPA	6010	
Cadmium	EPA	7131	
Calcium	EPA	200.7	
Calcium	EPA	6010	
Chromium	EPA	200.7	
Chromium	EPA	6010	
Chromium, Hexavalent	SM	3500-Cr B	
Chromium, Hexavalent	ASTM	D1687-92	
Cobalt	EPA	200.7	
Cobalt	EPA	6010	
Copper	EPA	200.7	
Copper	EPA	6010	

Parameter Name	Reference	Method Number	Notes
Gold	EPA	231.2	
Hardness, Total (as CaCO ₃)	EPA	200.7	
Hardness, Total (as CaCO ₃)	EPA	6010	
Iron	EPA	200.7	
Iron	EPA	6010	
Lead	EPA	200.7	
Lead	EPA	239.2	
Lead	EPA	6010	
Lead	EPA	7421	
Lithium	EPA	200.7	
Lithium	EPA	6010	
Magnesium	EPA	200.7	
Magnesium	EPA	6010	
Manganese	EPA	200.7	
Manganese	EPA	6010	
Mercury	EPA	245.1	
Mercury	EPA	7470	
Mercury	EPA	7471	
Molybdenum	EPA	6010	
Molybdenum	EPA	200.7	
Nickel	EPA	200.7	
Nickel	EPA	6010	
Potassium	EPA	200.7	
Potassium	EPA	6010	
Selenium	EPA	200.7	
Selenium	EPA	270.2	
Selenium	EPA	6010	
Selenium	EPA	7740	
Silica	EPA	200.7	
Silver	EPA	200.7	
Silver	EPA	272.2	
Silver	EPA	6010	
Silver	EPA	7761	
Sodium	EPA	200.7	
Sodium	EPA	6010	
Strontium	EPA	200.7	
Strontium	EPA	6010	

Parameter Name	Reference	Method Number	Notes
Thallium	EPA	200.7	
Thallium	EPA	279.2	
Thallium	EPA	6010	
Thallium	EPA	7841	
Titanium	EPA	200.7	
Titanium	EPA	6010	
Vanadium	EPA	200.7	
Vanadium	EPA	6010	
Zinc	EPA	200.7	
Zinc	EPA	6010	
BTEX	EPA	8021	
Organochlorine Pesticides	EPA	608	
Organochlorine Pesticides	EPA	8081	
Polychlorinated Biphenyls	EPA	608	
Polychlorinated Biphenyls	EPA	8082	
Total Pet Hydrocarbons - Diesel	WDOE	NWTPH-Dx	1,2
Total Pet Hydrocarbons - Gasoline	WDOE	NWTPH-Gx	1,2
BNA Extr (Semivolatile) Organics	EPA	625	
BNA Extr (Semivolatile) Organics	EPA	8270	
Volatile Organic Compounds	EPA	624	
Volatile Organic Compounds	EPA	8260	

Accredited Parameter Note Detail

(1) *Analytical Methods for Petroleum Hydrocarbons*, Publication No. ECY 97-602, June 1997. (2) Provisional pending an acceptable performance evaluation result (WAC 173-50-110). n (3) Interim pending an on-site assessment of the lab's analytical capability (WAC 173-50-100).



Authentication Signature

Perry Brake -- Unit Supervisor, Washington State Department of Ecology -- Lab Accreditation Unit

STATE OF WASHINGTON

DEPARTMENT OF HEALTH

DRINKING WATER TESTING LABORATORY CERTIFICATION PROGRAM

SVL Analytical, Inc.
One Government Gulch
P.O. Box 929
Kellogg, ID 83837-0929
WASHINGTON CODE: #050

having met the requirements of the Regulations Governing Laboratory Certification and
Standard of Performance for WAC 246 - 390 et. seq.
is hereby approved as a

STATE CERTIFIED DRINKING WATER LABORATORY

(per reciprocity agreement with the State of Idaho)

To perform drinking water analyses for:

CHEMISTRY

Issued in Seattle on:

6/25/2002

By

Marina Silverstone

Marina Silverstone, Acting Office Director
D.W. Laboratory Certification Program

This Contract is accepted for Laboratory by:



Washington State Department of
Health
Public Health Laboratories

EXPIRATION DATE

July 31, 2003

DATE

TO BE CONSPICUOUSLY DISPLAYED AT THE LABORATORY WITH THE ANNUAL CERTIFIED PARAMETER LIST



G
consulting
scientists and
engineers

October 10, 2002

Ms. Linda Meyer (WCM-121)
Project Manager RCRA/Superfund
U.S. EPA Region 10
1200 Sixth Avenue
Seattle, WA 98101

**Subject: Dewatering Pit Sampling and Analysis Plan to Support Remedial Design
Simplot Plant Area Eastern Michaud Flats Superfund Site**

Dear Linda:

On behalf of the J.R. Simplot Company, please find attached three copies of the above-referenced document. The plan has been revised per EPA's comments. I believe that we have addressed all your comments with the following minor modifications:

- The project team for the sampling event is small and so we provided a description of the structure rather than a diagram (last part of General Comment 4);
- Specific comment 6 (on draft Section 3.0; Section 4.0 is the revised plan) stated that the section lacked sufficient detail on the sampling procedures. This section was actually intended to provide an overview of the sampling and details were provided in Section 4.1 (Section 5.1 of the revised plan). We have, however, added more details to Section 5.1 (Sample Collection).

Per recent communications, the sampling is scheduled for the afternoon of October 16.

Please do not hesitate to call if you have any questions or comments. I look forward to seeing you in Pocatello next week.

Respectfully,
MFG, INC.

Andrew C. Koulermos
Senior Chemical Engineer

C: Doug Tanner - IDEQ Pocatello
Roger Turner - ShoBan Tribe
Ward Wolleson - J.R. Simplot Company

MFG OFFICE LOCATIONS

CALIFORNIA

Arcata
Irvine
San Francisco

COLORADO

Boulder
Fort Collins

IDAHO

Osburn

MONTANA

Missoula

NEW JERSEY

Edison

OREGON

Portland

PENNSYLVANIA

Pittsburgh

TEXAS

Austin
Fort Worth
Houston
Port Lavaca
Texarkana

WASHINGTON

Seattle

CORPORATE HEADQUARTERS

MFG, Inc.

4900 Pearl East Circle
Suite 300W
Boulder, Colorado 80301-6118
303/447-1823
303/447-1836/FAX
www.mfgenv.com